

# CONTENTS

UNIT

1

## Force and Motion

1. Types of levers.
2. Law of levers.



UNIT

2

## Electric Energy

1. The electric lamps.
2. Dangers of electricity and how to deal with it.



UNIT

3

## The Universe

1. The solar eclipse.
2. The lunar eclipse.



UNIT

4

## Structure and Function of Living Organisms

- Absorption and transmission of water and mineral salts in plants.





# UNIT 1

## Force and Motion

Lessons of the unit :

1. Types of levers.
2. Law of levers.



### UNIT OBJECTIVES

By the end of this unit, you will be able to :

- Determine what is meant by a lever and its importance.
- List examples explaining types of levers.
- Identify some applications of levers in the daily life.
- Conduct practical experiments to deduce the law of levers.
- Apply some examples of the law of levers.





## 1

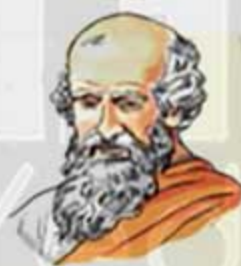
## LESSON

## Types of levers

- Long time ago, man invented many simple machines to help him to perform heavy tasks more easily .



- The most common simple machines are levers that were first described in 260 B.C by the Greek scientist **Archimedes** .



Look at the following pictures that represent some examples of levers, then regard the common properties among them.



Wheelbarrow



Nutcracker



Scissors

lever

خواص مشتركة common properties

خواص مشتركة



You will observe that all the previous tools share in the following :

- They consist of a rigid bar (straight or curved).
- There is an effort force exerted by a person to equilibrate the resistance force.
- There is a fixed point that the bar rotates around called "fulcrum".

*From the previous observations, we conclude that :*

### Lever

It is a rigid bar (straight or curved) that rotates around a fixed point called fulcrum and is affected by an effort force and a resistance force.

### The structure of lever

Any lever consists of :

1. A resistance force **R**
2. An effort force **F**
3. Fulcrum **O**

#### 1. A resistance force (R) :

It is the force resulted from the weight of the body that we want to move.



#### 2. An effort force (F) :

It is the force that is exerted by a person to equilibrate the resistance.

#### 3. Fulcrum (O) :

It is a fixed point , where the bar rotates around.

### Examples on levers :

There are many examples of levers as :

1. Seesaw.
2. Crowbar.
3. Scissors.
4. Bottle opener.
5. Nutcracker.
6. Stapler.
7. Ice or sweet holder.
8. Wheelbarrow.
9. Manual broom.

equilibrate	تُعاوَل / تُكافَأ	wheelbarrow	عربة الحديقة	seesaw	أرجوحة	fulcrum	محور الارتكاز
nutcracker	كسارة البندق	stapler	دباسة	manual broom	المكنسة اليدوية	resistance	المقاومة
bottle opener	فتاحة زجاجة	exerted	المبذلة	sweet holder	ماسك الحلوى	effort	جهد
crowbar	العنلة	rigid bar	ساق متينة				



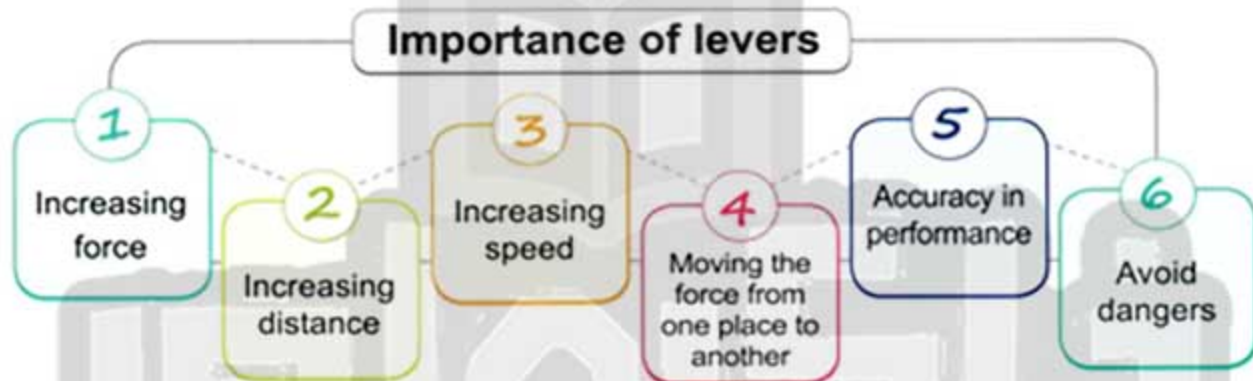
## Question

Complete the following sentences :

- ..... is a fixed point, where the bar rotates around.
- The ..... consists of a resistance force, ..... and an effort force.
- ..... is resulted from the weight of the body that we want to move.

## The importance of levers

Levers are very important in our life because they make the tasks be performed more easily by doing one or more of the following functions :



## 1 Increasing force :

Some levers save the exerted effort by using a small force to move heavy loads.

**Examples :**

1. Crowbar.
2. Nutcracker.



## 2 Increasing distance :

Some levers allow exerting force for a small distance to move an object for a longer distance.

**Examples :**

In the manual broom, your hand moves a small distance at the upper part of the broom, while its lower part moves a longer distance.



accuracy in performance

الدقة في أداء العمل

avoid dangers

تجنب الأخطار



**3 Increasing speed :**

Some levers increase the speed of objects that we inflict on.

**Examples :**

Hockey bat.

**4 Moving force from one place to another :**

**Examples :**

In the manual broom , the force of your hand moves from one place to another to collect the garbage without bending.

**5 Accuracy in performance :**

Some levers are used to pick up very small objects.

**Examples :**

Tweezers.

**6 Avoid dangers :**

Some levers are used to pick up the hot, cold and poisonous materials.

**Examples :**

Coal holder (coal tongs) and ice holder.



**G.R.**

- **The crowbar is considered as an increasing force lever.**  
Because it is used to move heavy loads by using a small effort force.
- **Doctors and watch makers use tweezers as a lever.**  
Because it is used to pick up very small objects.

inflict  
bending  
pick up

تؤثر hockey bat  
الإنشابة tweezers  
يلتقط

مضرب الهوكي garbage  
الملقط coal holder

القمامة  
ماسك اللحم



## Exercise

Complete the following sentences :

1. .... is an example of levers used to increase the speed of objects that we inflict on.
2. .... is an example of levers used to pick up small objects.
3. .... and .... are examples of levers used to increase force.

## Answer

1. Hockey bat
2. Tweezers
3. Crowbar - nutcracker

## Types of levers

Levers are classified into three types according to the location of effort force, resistance force and fulcrum.

### Types of levers are

1<sup>st</sup> Class  
LEVERS

2<sup>nd</sup> Class  
LEVERS

3<sup>rd</sup> Class  
LEVERS

## 1 First class levers

They are the most popular type of levers in our daily life.

### First class levers

They are levers that have the fulcrum (O) between the effort force (F) and the resistance force (R).



location

مكان first class levers

روافع النوع الأول popular

انتشاراً

second class levers

روافع النوع الثاني third class levers

روافع النوع الثالث



G.R.

- Wheelbarrow is a second class lever.

Because it has the resistance force between the effort force and fulcrum.

### 3 Third class levers

#### Third class levers

They are levers that have the effort force (F) between the resistance force (R) and fulcrum (O).



fishing tool      صنارة السمك



## NOTE

Each of tweezers, ice holder and sweet holder are composed of two third class levers.

G.R.

**Ice holder is a third class lever.**

Because it has the effort force between the resistance force and fulcrum.

**From your study of the types of levers, you can determine the type of any lever in our daily life by doing the following steps :**

**How to determine the type of a lever :**

1. Determine the position of effort force, resistance force and fulcrum.
2. Identify the mid point of the lever.
3. Determine the type of the lever as in the following table.

The mid point :	The fulcrum (O)	The resistance force (R)	The effort force (F)
Type of lever :	First class lever.	Second class lever.	Third class lever.

**Comparison between first, second and third class levers :**

Points of comparison	1 <sup>st</sup> Class LEVERS	2 <sup>nd</sup> Class LEVERS	3 <sup>rd</sup> Class LEVERS
<b>Definition :</b>	It is a lever that has fulcrum between resistance force and effort force.	It is a lever that has resistance force between fulcrum and effort force.	It is a lever that has effort force between fulcrum and resistance force.
<b>Examples :</b>	Seesaw, scissors, crowbar, pliers and water pump.	Nutcracker, wheelbarrow and bottle opener.	Tweezers, hockey bat, ice holder and manual broom.

**Try** to answer

Worksheet 1

in the Notebook.



# Remember



## ◉ Lever :

It is a rigid bar that rotates around a fixed point called fulcrum and is affected by an effort force and a resistance force.

- ◉ A resistance force is the force that resulted from the weight of the body that we want to move.
- ◉ An effort force is the force exerted by a person to equilibrate the resistance.
- ◉ Fulcrum is a fixed point where the bar (lever) rotates around.

## ◉ Importance of levers are :

1. Increasing force such as crowbar and nutcracker.
2. Increasing distance such as manual broom.
3. Increasing speed such as hockey bat.
4. Moving force from one place to another such as manual broom.
5. Accuracy in performance such as tweezers.
6. Avoid dangers such as ice holder and coal tongs.

## ◉ Types of levers :

1. First class levers : fulcrum lies between effort force and resistance force.
2. Second class levers : resistance force lies between effort force and fulcrum.
3. Third class levers : effort force lies between resistance force and fulcrum.



# Questions on lesson one



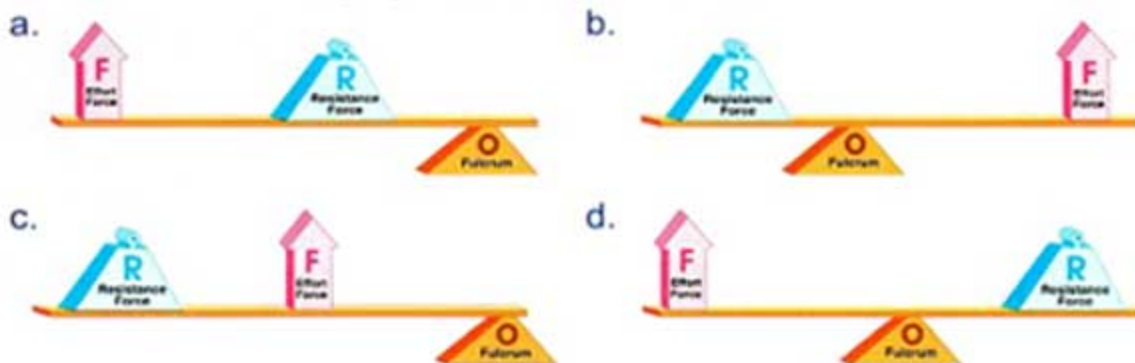
Questions signed by have been taken from the school book.

## 1. Choose the correct answer :

- The most common simple machines are ..... (El-Menofia 2016)  
a. levers.      b. bicycles.      c. car machines.      d. (a), (b) and (c).
- The lever rotates around a fixed point called .....  
a. resistance force.      b. fulcrum.  
c. effort force.      d. a rigid bar.
- Levers were first described in 260 B.C by the Greek scientist .....  
a. Archimedes.      b. El-Hassan Ibn El-Haitham.  
c. Newton.      d. Mendel.
- ..... is a rigid bar that rotates around fulcrum, and is affected by an effort force and a resistance force.  
a. Lever      b. Solution      c. Mixture      d. Friction force
- The ..... force is exerted by a person to equilibrate the resistance.  
a. fulcrum      b. effort      c. friction      d. (a) and (b)
- Any lever consists of .....  
a. a resistance force (R).      b. an effort force (F).  
c. a fulcrum (O).      d. (a) , (b) and (c).
- All the following are from the importance of levers except .....  
a. increasing speed.      b. increasing force.  
c. increasing size.      d. accuracy in performance. (Sohag 2016)
- ..... is a lever that uses a small force to make a great effort.  
a. Crowbar      b. Hockey bat      c. Ice holder      d. Manual broom
- ..... increases the speed of objects that we affect them.  
a. Manual broom      b. Seesaw  
c. Hockey bat      d. Coal holder
- Tweezers are used to .....  
a. move a heavy load.      b. increase the speed of the ball.  
c. pick up very small objects.      d. hold the cold materials.
- Which of the following levers is used to avoid dangers ? .....  
a. Coal holder.      b. Scissors.      c. Seesaw.      d. Manual broom.



12. Which of the levers derived is used to enlarge the distance ? .....  
 a. The tweezer. b. Crowbar. c. The broom. d. Coal holder.
13. Which of the following levers moves force from one place to another ? .....  
 a. Wheelbarrow. b. Nutcracker.  
 c. Manual broom. d. Pincers.
14. The opposite figure represents the ..... lever.  
 a. first class  
 b. second class  
 c. third class  
 d. fourth class
15. The levers that have the fixed point (fulcrum) between the resistance force and effort force are .....  
 a. first class levers. b. third class levers.  
 c. second class levers. d. fourth class levers.
16. From the first class levers is ..... (Beheira & El-Gharbia 2016)  
 a. nutcracker. b. sweet holder. c. scissors. d. manual broom.
17. .... have the resistance force between the effort force and fulcrum.  
 a. Third class levers b. First class levers  
 c. Second class levers d. (a) , (b) and (c) (Cairo 2017)
18. Soda water opener is a .....  
 a. first class lever. b. second class lever.  
 c. fourth class lever. d. third class lever.
19. The 1<sup>st</sup> class lever differs from the 2<sup>nd</sup> class lever in .....  
 a. the absence of the effort force. b. the presence of a fixed point.  
 c. the position of fulcrum. d. (a) and (b).
20. Which of the following figures represents the third class lever ? .....





## Unit One

21. .... are from the second class levers. (Aswan 2015)  
 a. Nutcracker, wheelbarrow and bottle opener  
 b. Sweet holder, wheelbarrow and soda water opener  
 c. Tweezers, hockey bat and manual broom  
 d. Paddle, pincers and scissors
22. Which of the following is a 2<sup>nd</sup> class lever ? ..... (Qena & Beheira 2015)  
 a. Sweet holder. b. Wheelbarrow. c. Seesaw. d. Hockey bat.
23. .... have the effort force between the resistance force and fulcrum.  
 a. Third class levers b. First class levers  
 c. Second class levers d. (b) and (c)
24. The effort force is between the resistance and fulcrum in .....  
 a. nutcracker. b. scissors. c. sweet holder. d. crowbar. (Fayoum 2017)
25. .... is a lever from the 3<sup>rd</sup> order. (Ismailia & Matrouh 2017)  
 a. Sweet holder b. Scissors c. Nutcracker d. Nail clippers
26. All the following are from the 3<sup>rd</sup> class levers except .....  
 a. wheelbarrow. b. fishing tool.  
 c. manual broom. d. sweet holder. (Dakahlia 2017)
27. Wheelbarrow is considered from ..... class levers. (South Sinai & Gharbia 2015)  
 a. first b. second c. third d. fourth
28. All the following are from the first class levers except ..... (Ismailia 2015)  
 a. the crowbar. b. the scissors. c. nutcrackers. d. the seesaw.
29. Crowbar is considered from ..... class levers. (Alex. 2016)  
 a. first b. second c. third d. fourth

## 2. Choose from column (B) what suits in column (A) :

(A)	(B)
1. Lever.	a. A force that is applied by a person to overcome the resistance.
2. Third class levers.	b. They have the resistance between effort force and fulcrum.
3. Fulcrum.	c. A fixed point at which the lever rotates.
4. First class levers.	d. A rigid bar rotates around a fixed point and is affected by an effort force (F) and a resistance (R).
5. Second class levers.	e. They have the fulcrum between the resistance and effort force.
6. Effort force.	f. They have the effort force between (O) and (R).

1. .... 2. .... 3. .... 4. .... 5. .... 6. ....



3. Put (✓) in front of the right statement and (×) in front of the wrong one, then correct it :

1. The levers are considered as one of the first simple machines which man invented in the past. (Ismailia 2015) ( )
2. The lever is a rigid bar that rotates around a fixed point called resistance. ( )
3. Any lever consists of a resistance force and an effort force only. ( )
4. The effort force is a force that is exerted by a person to equilibrate the resistance. ( )
5. The crowbar is an increasing force lever. ( )
6. Levers make tasks easier. ( )
7. Wheelbarrow and nutcracker save the exerted effort. ( )
8. Water pump is a kind of levers which pick up the very small objects. ( )
9. Levers were first described by the Greek scientist Archimedes. ( )
10. In the first class levers, the resistance is between the effort force and fulcrum. ( )
11. From the functions of levers is to increase the force. (Giza 2016) ( )
12. Among the functions of levers is to decrease the distance. (Cairo 2016) ( )
13. From the functions of levers is to decrease the speed. (Cairo 2017) ( )
14. The fulcrum in scissors lies between force and resistance. ( )
15. The crowbar is an example of the first class levers. (Menofia 2015) ( )
16. In the 2<sup>nd</sup> class levers, the resistance is between the effort force and fulcrum. (Dakahlia & Ismailia 2017) ( )
17. The third class levers are the most popular type of levers. ( )
18. Pliers are composed of three first class levers. ( )
19. Nail clippers have fulcrum between the effort force and the resistance force. ( )
20. The third class levers have fulcrum between the effort force and resistance. (Menofia 2015) ( )
21. Stapler, bottle opener and hammer claw are examples of third class levers. ( )
22. In hockey bat, the effort force is between the resistance force and fulcrum, so it is a first class lever. ( )
23. The second class levers have the effort force between the resistance and fulcrum. ( )



## Unit One

24. The fulcrum of any lever is always between force and resistance.

(Qena 2016) ( )

25. The nutcracker is considered as a first class lever.

( )


26. Soda water opener is a second class lever, while the fishing tool is a first class lever.

( )

#### 4. Write the scientific term of each of the following :

1.  The fixed point of a rigid bar on which the bar rotates.


(Aswan 2017) ( )

2.  A rigid bar that rotates around a fixed point, and is affected by an effort force and a resistance force.

(Cairo & Damietta 2017) ( )

3. A force that is resulted from the body that we want to move it. ( )


4. A force that is exerted by a person to equilibrate the resistance force. ( )

5.  Levers that have the fixed point between the effort force and the resistance force.


(Suez & The New valley 2017) ( )

6. The most popular type of levers in our daily life.

( )

7.  Levers that have the resistance between the effort force and the fixed point.

(Fayoum 2017) ( )

8.  Levers that have the effort force between the resistance and the fixed point.

(Alex. & El-Menofia 2017) ( )

9. The type of levers that its mid point is the effort force.

( )

10. Levers that have fulcrum between resistance (R) and effort force (F). ( )

#### 5. Complete the following statements :

1. A simple machine consists of a bar that makes the tasks be performed more easily is called .....

2. .... is considered as one of the first simple machines which were invented in the past.

3. Levers were first described in 260 B.C by the Greek scientist .....

4. The lever is a ..... that rotates around a fixed point called fulcrum.








(Suez 2017)

5. The lever is a rigid bar that rotates around a fixed point, and is affected by ..... and .....

6. Any lever consists of ..... , ..... and .....

7. .... is resulted from the body that we want to move.



8. .... is exerted by a person to equilibrate the resistance force.
9. The fixed point, where the rigid bar rotates on is called .....
10.  Levers which make tasks perform more easily by means of ..... ,  
..... or .....
11. .... , ..... and ..... are from the importance of levers.
12. .... , ..... and bottle opener save the exerted effort by using a small  
force to make a great effort.
13. .... is an example of levers used to increase force, while ..... is  
an example of levers used to increase the distance.
14. .... is an increasing speed lever. (El-Menofia 2017)
15. .... is a lever that moves force from one place to another place without  
bending.
16. .... is (are) very accurate lever that is used to pick up the very small  
objects.
17. .... is a lever that is used to avoid dangers. (Gharbia 2017)
18. Levers like ..... and ..... use a small effort to move a heavy load.
19. .... holder and ..... holder are used to pick up the hot , cold and  
poisonous materials.
20. The types of levers are ..... , ..... and .....
21. .... is the most popular type of levers in our daily life.
22.  ..... and ..... are examples of the first class levers. (Dakahlia, 2017)
23. Water pump is a ..... class lever , while ..... is a second class lever.
24. In the second class levers, the resistance is found between .....  
and ..... (Dakahlia 2015)
25.  ..... and ..... are examples of the second class levers. (Sohag 2015)
26. In the first class levers, the fulcrum is found between ..... and .....  
(Sohag & Matrouh 2017)
27. Stapler and wheelbarrow have the ..... between fulcrum and .....
28.  ..... and ..... are examples of the third class levers.
29. The effort force is between the resistance force and fulcrum in .....
30.  The nutcracker is an example of the ..... levers. (Suez 2017)
31.  The manual broom is an example of the ..... levers. (South Sinai 2017)
32.  The scissors are example of the ..... levers. (Cairo 2017)
33. The crowbar is considered a ..... class lever, while wheelbarrow is  
an example of ..... class lever. (Sohag 2016)



## Unit One

34. Sweet holder is an example of the ..... levers. (Cairo 2015)
35. Seesaw is considered a ..... class lever, while the fish hook is ..... class lever. (Giza 2017)
36. In the ..... class levers the ..... is between the fulcrum and the force of resistance. (Ismailia 2015)

## 6. Correct the underlined words :

- The most common simple machines are bicycles. (.....)
- Lever is a rigid bar that rotates around a fixed point called effort. (.....)
- The lever consists of fulcrum only. (.....)
- Fulcrum is applied by a person to equilibrate the resistance force. (.....)
- Some of the levers allow the increase in the speed of objects we inflict on as in the manual broom. (.....)
- The coal holder is used in increasing distance. (El-Menofia 2016) (.....)
- The most popular type of levers in our daily life is the second class levers. (.....)
- Seesaw, scissors and bottle opener are examples of the first class levers. (.....)
- In the first class levers, the resistance force is between fulcrum and effort force. (El-Menofia 2017) (.....)
- Tweezers, coal holder and hockey bat are examples of the first class levers. (.....)
- The fulcrum lies between the effort force and the resistance force in the third class levers. (Behiera & Port Said 2017) (.....)
- Pliers are second class levers. (.....)
- Nutcracker is from the first class levers. (Alex. & Sharkia 2017) (.....)
- In the second class levers, the effort force is between the resistance force and fulcrum. (.....)
- The crowbar is considered from the third class levers. (El-Menofia 2016) (.....)

## 7. Give reasons for the following :

- Wheelbarrow is a lever.

.....

.....

- Some levers save effort.

.....



3. Nutcracker is considered as an increasing force lever.
4. The manual broom is considered as an increasing distance lever.
5. Doctors and watch makers use tweezers as a lever.
6. Levers are very important in our daily life.
7. Crowbar, water pump and paddle are first class levers. (Alex. 2017)
8. Bottle opener and stapler are second class levers.
9. Hockey bat and fishing tool are third class levers.
10. Wheelbarrow is a second class lever, while sweet holder is a third class lever.

**8. Choose the first class levers from the following machines :**

Pincers – Tweezers – Seesaw – Wheelbarrow – Nail clippers –  
Soda water opener – Stapler – Ice holder – Hockey bat – Paddle –  
Nutcracker – Scissors – Manual broom – Hammer claw – Fishing tool.

**9. What is meant by ... ?**

1. Lever. (Port Said & Cairo 2015)
2. Effort force.
3. Fulcrum.
4. First class levers.
5. Second class levers.



## Unit One

6. Third class levers.

10. Mention one example of lever used for :

(Ismailia 2015)

1. Avoid dangers : .....
2. Increasing speed : .....
3. Increasing force : .....
4. Increasing distance : .....
5. Moving force from one place to another : .....
6. Accuracy in performance : .....

11. Classify the following machines according to the type of lever :



(1) .....



(2) .....



(3) .....



(4) .....



(5) .....



(6) .....

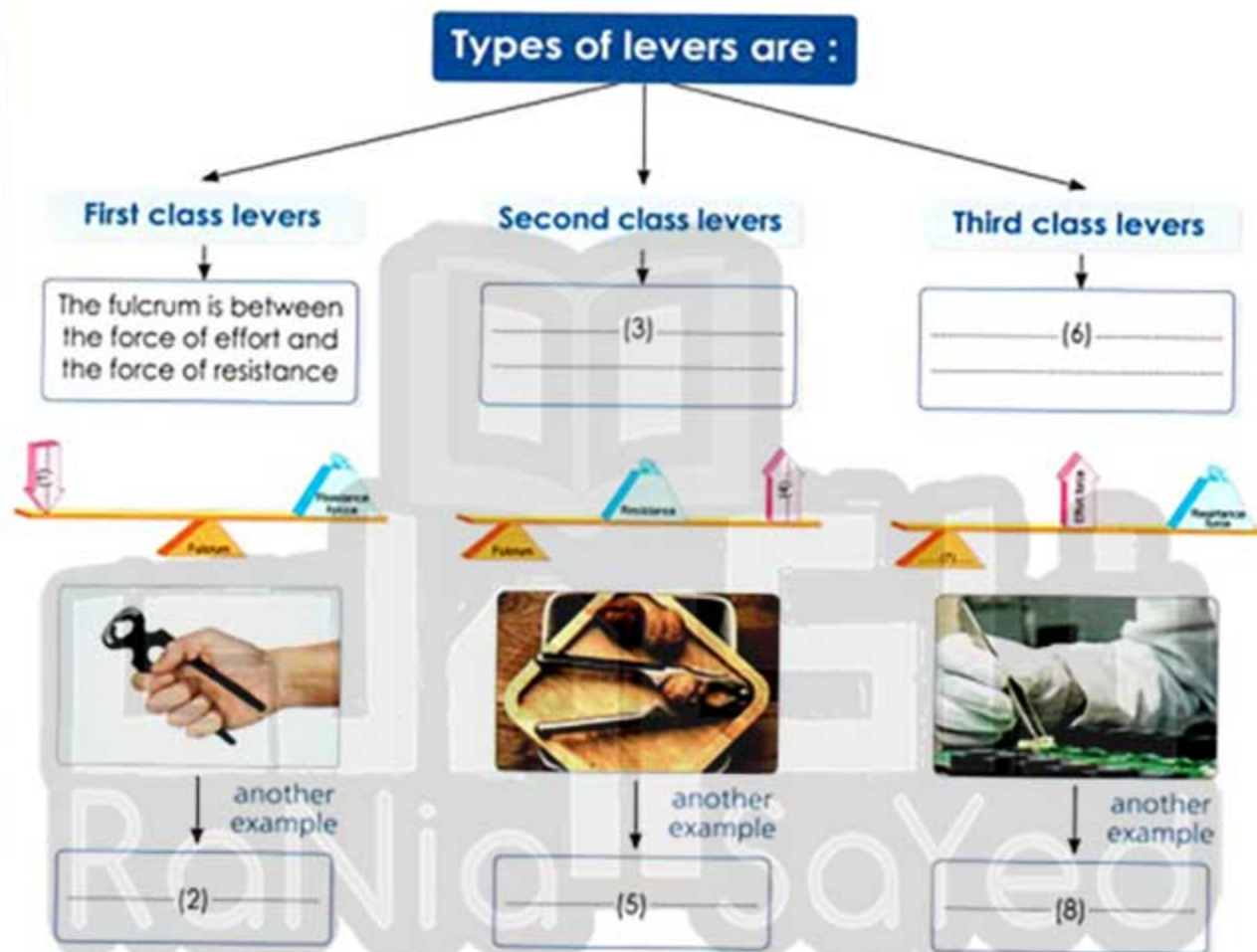
12. How to determine the type of lever ?

13. Compare between the three types of levers according to the location of fulcrum, resistance and effort force giving examples for each type. (Damietta 2016)



14. What would happen if we didn't have levers ?

15. Complete the following diagram :





# Timss Questions



1. Which equation summarizes the formation of 1<sup>st</sup> class lever :

- (Effort force  $\rightarrow$  Resistance force  $\rightarrow$  Fulcrum)  $\rightarrow$  Stapler
- (Effort force  $\rightarrow$  Fulcrum  $\rightarrow$  Resistance force)  $\rightarrow$  Pincers
- (Effort force  $\rightarrow$  Fulcrum  $\rightarrow$  Resistance force)  $\rightarrow$  Tweezers
- (Resistance force  $\rightarrow$  Effort force  $\rightarrow$  Fulcrum)  $\rightarrow$  Ice holder

2. Ahmed investigates the type of levers which is considered the most popular type of levers in our daily life , he plots his results as shown below.



• In the previous graph, first class levers are considered the letter .....

- A
- B
- C

3. Which two levers are second class levers :

- Pincers and pliers.
- Stapler and tweezers.
- Bottle opener and stapler.
- Manual broom and hockey bat.

4. Some levers increase the speed of objects that we inflict on as tweezers.

Choose the correct answer :

- Statement and the example are right.
- Statement and the example are wrong.
- Statement is wrong while the example is right.
- Statement is right while the example is wrong.



5. Label each picture by putting the position of fulcrum (O), effort force (F) and resistance force (R), then mention the type of each lever.

(1)



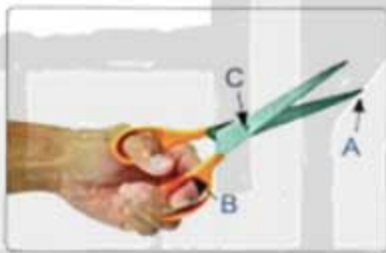
- (A) is .....
- (B) is .....
- (C) is .....
- The type of lever is .....

(2)



- (A) is .....
- (B) is .....
- (C) is .....
- The type of lever is .....

(3)



- (A) is .....
- (B) is .....
- (C) is .....
- The type of lever is .....



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## 2

## LESSON

## Law of levers

We have learned in the previous lesson that any lever is :

A rigid bar that rotates around a fixed point called **fulcrum (O)** and is affected by an **effort force (F)** and a **resistance force (R)**.



According to the type of a lever, sometimes :

The effort force  $<$  the resistance force.

The effort force  $>$  the resistance force.

The effort force  $=$  the resistance force.

- The mathematical equation that explains the relation between effort force and resistance force is called "**law of levers**".

law

قانون mathematical equation

المعادلة الرياضية





## Activity

To deduce the law of levers :



## Tools:

Different objects with different weights – metallic or wooden bar – a strong rope – a spring balance – metric ruler.



## Steps:

1. Assign the weight of the first object (your school bag) by the spring balance to determine the value of the resistance force = ..... Newton .
2. Hang the metallic bar from its middle with a rope until it becomes completely stable in an upright position.  
(The rope represents fulcrum)
3. Fix the bag at one end of the bar and the spring balance at the other end.
4. Pull the spring balance downward until the balance occurs, then determine the reading of the spring balance that represents the value of the effort force = ..... Newton .
5. Measure the distance between the effort force and fulcrum which is known as "the force arm" = ..... cm. by the metric ruler.
6. Measure the distance between the resistance and fulcrum which is known as "the resistance arm" = ..... cm. by the metric ruler.



deduce

يستنتج pull

يسحب / يشد spring balance

الميزان الزنبركي

resistance arm

ذراع المقاومة force arm

ذراع القوة assign

يعين

upright position

وضع مستقيم rope

حبل stable

مُتَبَرِّك



## Unit One

7. Repeat the previous steps by changing :

- the weight of object.
- the position of object.
- the position of the spring balance.

8. Record the results in the following table :

Object	The effort force (Newton)	The force arm (cm)	Resistance force (Newton)	The resistance arm (cm)	The effort force × its arm	The resistance × its arm
①	50	40	50	40	2000	2000
②	60	30	120	15	1800	1800
③	70	20	35	40	1400	1400
④	20	10	25	8	200	200

### Observation:

In each time you observe that the effort force times the force arm is equal to the resistance force times the resistance arm.

### Conclusion:

The law of levers states that :

$$\text{"The effort force} \times \text{its arm} = \text{The resistance force} \times \text{its arm"}$$

From the previous activity we can mention the following important points:

#### 1. Effort force arm (force arm)

It is the distance between the effort force and fulcrum.

#### 2. Resistance arm

It is the distance between the resistance force and fulcrum.

#### 3. When the force arm and the resistance arm are equal :

The effort force is **equal** to the resistance force (as in case of object 1) and this lever **doesn't conserve** effort.





## 4. When the force arm is longer than the resistance arm :

The effort force is **smaller** than the resistance force  
(as in case of objects 2 & 4)  
and this lever **conserves** effort.



## 5. When the force arm is shorter than the resistance arm :

The effort force is **larger** than the resistance force  
(as in case of object 3)  
and this lever **doesn't conserve** effort.



## NOTES

- The effort force and resistance force are measured in **Newton**.
- The force arm and the resistance arm are measured in **metre (m)** or **centimetre (cm)**.
- The factors that determine the values of force and resistance are the **force arm** and the **resistance arm**.

## Question

Choose the correct answer :

1. When the effort force is ..... the resistance force, so this lever conserves effort .  
a. equal to                      b. smaller than                      c. larger than
2. The distance between the effort force and fulcrum is called .....  
a. effort arm.                      b. resistance force.                      c. resistance arm.
3. When the effort force is ..... the resistance force, so this lever doesn't conserve effort .  
a. equal to                      b. larger than                      c. (a) and (b)

conserve effort

توفر الجهد

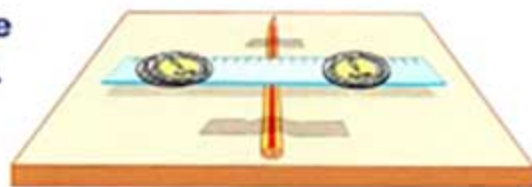


## Unit One

## Examples :

- 1 The opposite experiment illustrates one of the means to verify the law of levers.

Complete the following table, where the value of effort force and resistance force are expressed by the number of coins.



Effort force (number of coins)	The force arm (cm)	The resistance force (number of coins)	The resistance arm (cm)
2	5	1	a
3	10	b	10
4	c	2	10
d	15	6	5

## Answer

By applying the law of levers that states :

$$\text{Effort force} \times \text{its arm} = \text{Resistance force} \times \text{its arm}$$

a.  $2 \times 5 = 1 \times \text{the resistance arm}$

The resistance arm =  $\frac{2 \times 5}{1} = 10 \text{ cm}$ .

c.  $4 \times \text{the force arm} = 2 \times 10$ .

The force arm =  $\frac{2 \times 10}{4} = 5 \text{ cm}$ .

b.  $3 \times 10 = \text{resistance force} \times 10$

Resistance force =  $\frac{3 \times 10}{10} = 3 \text{ coins}$ .

d. Effort force  $\times 15 = 6 \times 5$ .

Effort force =  $\frac{6 \times 5}{15} = 2 \text{ coins}$ .

- 2 A force whose value equals 50 Newton affects a lever of the 2<sup>nd</sup> class that its force arm = 20 cm. Calculate the resistance force , where its resistance arm = 5 cm.

## Answer

$$\text{Effort force} \times \text{its arm} = \text{Resistance force} \times \text{its arm}$$

$$50 \times 20 = \text{resistance force} \times 5$$

$$\text{Resistance force} = \frac{50 \times 20}{5} = 200 \text{ Newton}.$$

applying  
illustrates

coins تطبيق  
means يوضح

expressed by  
verify وسائل

يُعبّر عنه  
يحقق



- 3 In the following figures, determine by drawing the position, where only one weight (equals 1N) is placed to regain the balance of the lever.  
(Keeping in your mind that the distance between every two openings is 1 cm).

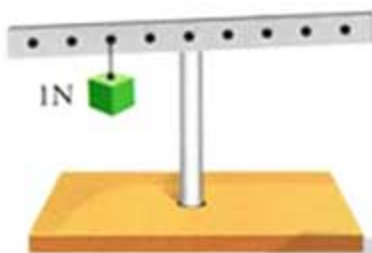


Fig. (a)

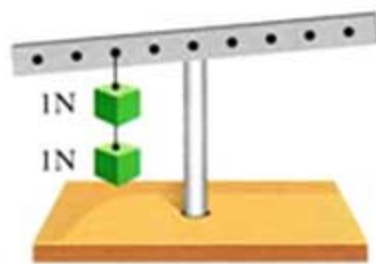


Fig. (b)

### Answer

By applying the law of levers that states :

**"Effort force  $\times$  its arm = Resistance force  $\times$  its arm"**

- The resistance force = 1 Newton.
- The effort force (the weight that we put) = 1 Newton.
- Arm of resistance = 2 cm.
- $1 \times \text{arm of force} = 1 \times 2$ .
- Arm of force = 2 cm.

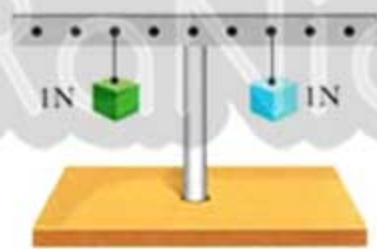


Fig. (a)



Fig. (b)

### Question

Write the scientific term :

1. It is the distance between the resistance and fulcrum. (.....)
2. The effort force  $\times$  Its arm = The resistance force  $\times$  Its arm. (.....)
3. It is the distance between the effort force and fulcrum. (.....)

regain

يستعيد keeping in your mind

أخذًا في الاعتبار



## Law of levers and conservation of effort



Some types of levers **conserve effort** (or has a mechanical benefit), while some other types of levers **don't conserve effort**.

By applying the law of levers on the three types of levers, we find that :

### 1 First class levers

There are three possibilities in this type of levers which are :

Possibility	Figure	Result
a. The force arm is shorter than the resistance arm.		The effort force is larger than the resistance force.
So, the first class lever in this possibility <b>doesn't conserve</b> (doesn't save) effort or has no mechanical benefit.		
b. The force arm is equal to the resistance arm.		The effort force is equal to the resistance force.
So, the first class lever in this possibility <b>doesn't conserve</b> (doesn't save) effort or has no mechanical benefit.		
c. The force arm is longer than the resistance arm.		The effort force is smaller than the resistance force.
So, the first class lever in this possibility <b>conserves</b> (saves) effort or has a mechanical benefit.		

possibilities

احتمالات conservation

توفير mechanical benefit

فائدة ميكانيكية



Generally, some of the first class levers conserve effort , but the others don't.

G.R.

**Sometimes the 1<sup>st</sup> class levers save effort.**

Because sometimes in the 1st class lever, the force arm is longer than the resistance arm, so the effort force is smaller than the resistance force.

2

## Second class levers

This type of levers always saves effort or has a mechanical benefit .

**Because,**

The force arm is always longer than the resistance arm, so the effort force is always smaller than the resistance force.



G.R.

**The nutcracker and wheelbarrow save effort or have a mechanical benefit.**

Because the force arm is always longer than the resistance arm, so effort force is always smaller than the resistance force .

3

## Third class levers

This type of levers don't conserve effort (has no mechanical benefit).

**Because ,**

The force arm is always shorter than the resistance arm, so the effort force is always larger than the resistance force.

**But ,**

All the third class levers and some of the first class levers that don't save effort (have no mechanical benefits) are beneficial in other things as :

- Increasing the distance.
- Increasing speed.
- Avoid dangers.
- Accuracy in performance.



beneficial

مفيد



## Unit One

## Comparison between the three types of levers :

Points of comparison	1 <sup>st</sup> Class LEVERS	2 <sup>nd</sup> Class LEVERS	3 <sup>rd</sup> Class LEVERS
1. Location of F,O,R :	The fulcrum (O) is between effort force (F) and resistance force (R).	The resistance force (R) is between fulcrum (O) and effort force (F).	The effort force (F) is between resistance force (R) and fulcrum (O).
2. Effort force arm and resistance arm :	The force arm may be longer than, shorter than or equal to the resistance arm.	The force arm is always longer than the resistance arm.	The force arm is always shorter than the resistance arm.
3. Saving effort :	Some of them save effort, but the others don't.	Always save effort.	Always don't save effort.
4. Benefits :	Some of them have a mechanical benefit, but the others have other benefits as increasing speed, increasing distance, avoid dangers and accuracy in performance.	All of them have a mechanical benefit as they save effort.	<ul style="list-style-type: none"> <li>- They are used to increase speed and distance.</li> <li>- They are used to avoid dangers.</li> <li>- Accuracy in performance.</li> </ul>

## Try to answer

- Worksheet 2
- General exercise of the school book on Unit 1
- Model exams on Unit 1 in the Notebook.



# Remember



## ⊙ Law of levers :

The effort force  $\times$  Its arm = The resistance force  $\times$  Its arm.

## ⊙ Effort force arm (force arm) :

It is the distance between the effort force and fulcrum.

## ⊙ Resistance arm :


It is the distance between resistance force and fulcrum.

- Effort force and resistance force are measured in **Newton**.
- Force arm and resistance arm are measured in **metre** or **centimetre**.
- When the force arm is **longer** than the resistance arm, the lever always saves effort (or has a mechanical benefit).
- When the force arm is **shorter** or **equal** to the resistance arm, the lever doesn't save effort (or has no mechanical benefit).
- Some of first class levers save effort, while the others don't.
- Second class levers always save effort.
- All third class levers don't save effort.



## Questions on lesson two



Questions signed by  have been taken from the school book.

**1. Choose the correct answer :**

1. The law of levers states that .....
  - a.  $\text{force} \times \text{its arm} = \text{resistance} \times \text{its arm}.$
  - b.  $\text{force} \div \text{its arm} = \text{resistance} \div \text{its arm}.$
  - c.  $\text{force} + \text{its arm} = \text{resistance} + \text{its arm}.$
  - d.  $\text{force} \times \text{its arm} = \text{resistance} + \text{its arm}.$
2. The values of effort and resistance in the lever depend on .....
  - a. the arm of force.
  - b. the arm of resistance.
  - c. the position of fulcrum.
  - d. (a) and (b).
3. The distance between the effort force and fulcrum is .....
  - a. the effort force.
  - b. the resistance arm.
  - c. the effort force arm.
  - d. the resistance force.
4. The distance between the resistance force and fulcrum is .....
  - a. the arm of force.
  - b. the arm of resistance.
  - c. the arm of force – arm of resistance.
  - d. the arm of force + arm of resistance.
5. When the arm of force is longer than the arm of resistance, the effort force is ..... the resistance.
  - a. larger than
  - b. smaller than
  - c. equal to
  - d. double
6. When the arm of force ..... the arm of resistance, the effort force equals the resistance force.
  - a.  $>$
  - b.  $<$
  - c.  $=$
  - d.  $\neq$
7. When the arm of force ..... the arm of resistance, the lever doesn't conserve effort.
  - a. is shorter than
  - b. is longer than
  - c. equals
  - d. (a) and (c)
8. When the arm of force equals 4 cm. and the arm of resistance equals 4 cm., so .....
  - a. the effort force = the resistance force.
  - b. the effort force  $>$  the resistance force.
  - c. the resistance force  $<$  the effort force.
  - d. the effort force  $<$  the resistance force.



9. The lever doesn't save effort when .....  
 a. the effort arm is longer than the resistance arm.  
 b. the effort arm is shorter than the resistance arm.  
 c. the effort force is larger than the resistance force.  
 d. (b) and (c).
10. The effort force and resistance force are measured in .....  
 a. Newton.                      b. metre.                      c. centimetre.                      d. Hertz.
11. Force arm is sometimes equal to resistance arm in ..... class levers.  
 (Damietta & Kalyoubia 2017)  
 a. first                      b. second                      c. third                      d. first and third
12. The type of levers which sometimes has a mechanical benefit is the .....  
 a. first class levers.                      b. second class levers.  
 c. third class levers.                      d. fourth class levers.
13. The type of levers which always doesn't save effort is the .....  
 a. first class levers.                      b. third class levers.  
 c. second class levers.                      d. fourth class levers.
14. The type of levers which always has a mechanical benefit is the .....  
 a. first class levers.                      b. second class levers.  
 c. third class levers.                      d. fourth class levers.  
 (Kafr El-Sheikh 2017)
15. When the effort arm equals 5 cm. and the resistance arm equals 10 cm., so .....  
 a. the type of lever may be a first class lever.  
 b. the effort force is larger than the resistance force.  
 c. the type of lever may be a third class lever.  
 d. (a), (b) and (c).
16. Which of the following levers saves effort ? .....  
 (Cairo & Giza 2016)  
 a. Scissors.                      b. Nutcracker.  
 c. Fishing tool.                      d. Sweet holder.
17. When the length of the force arm equals 2.5 metre and the length of the resistance arm equals 1.5 metre, so .....  
 a. the resistance force is larger than the effort force.  
 b. the lever has a mechanical benefit.  
 c. this lever saves effort.  
 d. (a), (b) and (c).
18. Which of the following levers doesn't save effort ? .....  
 a. Coal holder.                      b. Nutcracker.                      c. Wheelbarrow.                      d. Bottle opener.



## Unit One

19. Which of the following levers has the arm of force longer than the arm of resistance ? .....
- a. Manual broom. b. Ice holder.  
c. Soda water opener. d. Tweezers.
20. All the following levers don't save effort except .....
- a. nutcracker. b. ice holder. c. fishing tool. d. hockey bat.

2. Match column (A) with its correspondence in column (B) : (Kalyoubia 2015)

(A)	(B)
1. First class levers.	a. Levers that always conserve effort.
2. Second class levers.	b. Levers that do not conserve effort.
3. Third class levers.	c. Levers that sometimes conserve effort.
4. Levers.	d. A fixed point that a rigid bar rotates around.
5. The resistance.	e. A rigid bar rotates around a fixed point, and is affected by a force and a resistance.
6. The fulcrum.	f. A force that is resulted from the body that we want to move.

1. .... 2. .... 3. ....  
4. .... 5. .... 6. ....

3. Put (✓) in front of the right statement and (✗) in front of the wrong one, then correct it :

1. The force  $\times$  its arm = The resistance  $\times$  its arm. ( )
2. The resistance arm is the distance between the resistance force and fulcrum. ( )
3. When the force arm is equal to the resistance arm, the lever conserves effort. ( )
4. When the resistance arm is longer than the effort arm, the lever saves effort. ( )
5. When the resistance arm is shorter than the effort arm, the lever doesn't conserve effort. ( )
6. If the arm of force is shorter than the arm of resistance, the lever conserves effort. (Red Sea 2017) ( )
7. The effort force is measured in centimetre or metre. ( )
8. The length of the force arm and the length of the resistance arm determine the value of effort force and resistance force. ( )
9. The resistance arm is measured in metre. ( )



10. In the second class levers, the effort arm is always longer than the resistance arm. ( )
11. The resistance force is larger than the effort force in the third class levers. ( )
12. Some of the first class levers conserve effort while the others don't. ( )
13. In the wheelbarrow, the resistance arm is shorter than the effort arm. ( )
14. In the 3<sup>rd</sup> class levers, the arm of force may be equal to the arm of resistance. ( )
15. Hockey bat and tweezers have a mechanical benefit. ( )
16. Manual broom and ice holder don't conserve effort. ( )
17. In nutcracker, the effort arm is shorter than the resistance arm. ( )
18. In soda water opener, the resistance force is smaller than the effort force. ( )
19. The third class levers always save effort. (Giza 2017) ( )

#### 4. Write the scientific term of each of the following :

1. The distance between the effort force and fulcrum. (Cairo 2016) ( )
2. The distance between the resistance force and fulcrum. ( )
3. Force  $\times$  its arm = Resistance  $\times$  its arm. ( )
4. A force that increases when the effort force arm is shorter than the resistance arm. ( )
5. A force that increases when the resistance arm is shorter than the force arm. ( )
6. A type of levers that always conserves effort or has a mechanical benefit. (Qena 2016) ( )
7. A type of levers that sometimes saves effort and other times doesn't conserve effort. (Giza 2016) ( )
8. Type of levers that always doesn't save effort. (Beheira & Sohag 2017) ( )
9. A type of levers that sometimes its force arm is equal to the resistance arm. ( )
10. A type of levers, where the effort arm is always longer than the resistance arm. ( )
11. A type of levers, where the effort arm is always shorter than the resistance arm. ( )
12. A type of levers, where the effort force is always smaller than the resistance force. ( )
13. A type of levers, where the effort force may be larger or smaller than the resistance force. ( )



## Unit One

14. A type of levers, where the effort force is always larger than the resistance force. (.....)
15. They are simple machines that always save effort. (.....)

(North Sinai 2017)

## 5. Complete the following statements :

1. The law of levers states that .....
2. The arm of force is the distance between ..... and .....
3. The distance between fulcrum (O) and resistance(R) is called .....
4. Force  $\times$  its arm = .....  $\times$  ..... (El-Menofia 2016)
5. The factors that determine the values of force and resistance are ..... and .....
6. When the arm of force equals the arm of resistance, the ..... is equal to the .....
7. If the arm of force is shorter than the arm of resistance, the ..... is larger than ..... (Sharkia & Fayoum 2017)
8. The effort force is measured in .....
9. The resistance arm is measured in .....
10. When the force arm is longer than the resistance arm, ..... is smaller than .....
11. When the force arm is equal to the resistance arm, the lever doesn't conserve .....
12. The effort force is larger than the resistance force when ..... is longer than .....
13. The force and resistance are equal in levers if .....
14. The lever conserves effort when ..... arm is longer than ..... arm.
15. The lever doesn't conserve effort when ..... arm is shorter than ..... arm.
16. The only type of levers, where the arm of force and the arm of resistance are equal is the .....
17. There is a conservation of effort in the first class levers if ..... is longer than ..... (Damietta 2017)
18. The type of levers that always conserves effort is ..... , while the type of levers that doesn't always conserve effort is ..... (Gharbia 2015)







19. The first class levers have no ..... benefit when the force arm is shorter than ..... or when the two arms are .....
20. In the first class levers, when the effort force is ..... the resistance force, the lever has a mechanical benefit. (Giza 2015)
21. In the first class levers, when the effort force is equal to the resistance force, the lever ..... effort.
22. The second class lever has a mechanical benefit, because ..... is longer than .....
23. In the ..... levers, the effort force is always smaller than the resistance, while in the ..... levers, the effort force is always larger than the resistance force.
24. Wheelbarrow has a mechanical benefit as it is ..... class lever.
25. In stapler and nutcracker, the ..... is longer than .....
26. Tweezers and coal holder haven't a mechanical benefit, because ..... is shorter than .....
27. .... levers don't conserve effort, because the arm of resistance is always longer than the arm of effort force.
28. The lever conserves effort when its force arm is ..... than the resistance arm, and the force is ..... than the resistance. (Alex, 2017)
29. When the length of the resistance arm and the effort arm equals 5 cm. and the resistance = 2 Newton, so the effort force equals .....
30. When the effort force equals 20 Newton, resistance is 8 Newton and effort force arm = 4 cm. , so the resistance arm equals .....

#### 6. Give reasons for the following :

1. When the resistance arm is longer than the effort arm, the lever doesn't conserve effort.  
.....
2. When the force arm and the resistance arm are equal, the lever doesn't conserve effort or has no mechanical benefit.  
.....
3. When the force arm is longer than the resistance arm, the lever conserves effort.  
.....
4. The crowbar conserves effort.  
.....



## Unit One

5.  The force and resistance can be equal only in the first class levers. (Gharbia 2017)
6. Sometimes the 1<sup>st</sup> class levers save effort.
7.  The second class levers always conserve effort. (Cairo & Giza 2017)
8. The soda water opener saves effort.
9. The force is not equal to the resistance in the 2<sup>nd</sup> class lever.
10.  The third class levers always don't conserve effort. (Sharkia & Aswan 2017)
11. Nutcracker and wheelbarrow have a mechanical benefit.
12. In the 2<sup>nd</sup> class levers, the force is always less than the resistance.
13. In the stapler, the effort force is smaller than the resistance force.
14. •  Some of the levers are important to man although they don't conserve effort.  
• The 3<sup>rd</sup> class levers are very important in our life although they don't conserve effort. (Sohag 2015)
15. In spite of the importance of the coal holder, it is from the levers that don't save effort. (Kalyoubia 2015)

## 7. What is meant by ... ?

1. The law of levers.
2. The effort force arm.
3. The arm of resistance.



## 8. Correct the underlined words :

- The arm of force is the distance between the effort force and the resistance. (Damietta 2016) (.....)
- Force  $\times$  arm of resistance = Resistance  $\times$  its arm. (.....)
- When the arm of effort force is longer than the arm of resistance, the resistance is smaller than the effort force. (.....)
- When the arm of force is equal to the arm of resistance, the force is larger than the resistance. (.....)
- The only type of levers in which the arm of force may be equal to the arm of resistance is the third class levers. (.....)
- The third class levers always save effort. (Assiut & Red Sea 2016) (.....)
- The first class lever always hasn't a mechanical benefit. (.....)
- When the effort arm equals 5 cm., resistance arm equals 5 cm. and resistance equals 7 Newton, so the effort force equals 35 Newton. (.....)
- The only type of levers which always saves effort is the third class levers. (.....)
- When the effort arm is longer than the resistance arm, the force is larger than the resistance. (.....)
- If the resistance arm is longer than the effort arm, so the lever saves effort. (.....)
- Force arm is equal to resistance arm in second class levers. (.....) (Beheira 2015)
- Although crowbar is a third class lever, it conserves effort. (.....) (Gharbia 2017)

## 9. What happens when ... ?

- The force arm and the resistance arm are equal. (Ismailia 2017) (.....)
- The force arm is longer than the resistance arm. (El-Menofia 2017) (.....)
- The resistance force is equal to the effort force. (.....)
- The resistance arm is longer than the force arm. (Cairo 2016) (.....)
- The resistance force is larger than the effort force. (.....)



## Unit One

6. The effort force is larger than the resistance force.  
.....
7. Both of effort arm and resistance arm equal 7 metres.  
.....
8. The length of the force arm is half the length of the resistance arm for a lever.  
(Damietta 2017)  
.....

10. Compare between the three types of levers using the following table :

Points of comparison	First class lever	Second class lever	Third class lever
• Definition :	.....	.....	.....
• Importance :	.....	.....	.....
• Conservation of effort :	.....	.....	.....
• Examples :	.....	.....	.....

(Giza 2016)

11. The following table shows results of a balanced seesaw, answer the following questions :




Case	The force (Newton)	Arm of force (m)	The resistance (Newton)	Arm of resistance (m)
①	(a)	3	300	2
②	500	(b)	400	2.5
③	300	3	(c)	3
④	40	5	25	(d)
⑤	(e)	4	20	1

1. Find the missing numbers (a), (b), (c), (d) and (e) in the table.  
.....  
.....  
.....  
.....



2. Which cases save effort and which of them don't save effort ? Why ?

### 12. Problems :

- The boy whose weight is 250 Newton sits on a seesaw at 3 metres from the fulcrum. Where a 150 Newton girl must sit to balance the seesaw ?
- A long uniform metallic bar is hanged from its mid point. A force of 40 Newton is exerted at 5 cm. from this mid point. Find the weight which must be hanged at 25 cm. to make the bar get balanced.
- The length of the force arm of a crowbar is 100 cm. and the length of the resistance arm is 15 cm. If the value of resistance equals 400 Newton, calculate the value of effort force and mention the type of the lever.
-  The exerted force of the first class lever equals 500 Newton and the length of its arm is 20 cm. and is affected by a resistance with a value of 200 Newton. Find the length of the arm of the resistance. (Giza & Behelra 2017)
-  The length of the force arm of a third class lever is 5 cm. and the length of the arm of resistance is 15 cm. If the resistance has a value of 300 Newton, calculate the value of the affecting force. (Sharkia 2017)
-  The force affecting on a second class lever equals 200 Newton and the length of its arm is 50 cm. If the value of the resistance 1000 Newton, calculate the value of the resistance arm. (Dakahlia & Red Sea 2017)



## Unit One

7. In a 2<sup>nd</sup> class lever, the effort force is 100 Newton, length of the force arm = 25 cm. and the resistance = 500 Newton. Calculate the resistance arm. (Matrouh 2015)

8. A third class lever, where the effort force = 200 Newton, the force arm = 5 cm. and the resistance force = 100 Newton. Calculate the length the of the resistance arm. (El-Minia 2017)

9. A force of 500 Newton affects a first class lever and its arm of force equals 10 cm., the resistance equals 200 Newton and its arm of resistance equals 20 cm. in this example is the lever in state of balance or not and why ? (El-Menofia & Gharbia 2017)

10. In the opposite figure, calculate the effort force when the resistance force equals 12 Newton, then mention the type of lever and why ?



11. A force of 500 Newton affects a lever of the first order and its force arm is 20 cm. Calculate the resistance given that the arm of the resistance equal 50 cm. (Alex. 2016)

12. A force of 480 Newton affects a lever and the length of the force arm is 40 cm, if the length of resistance arm is 60 cm, Calculate :  
(1) The value of the resistance that regains the balance of the lever.

- (2) From the previous answer, complete the following statement :  
This lever ..... effort, and it is considered from the ..... or ..... class levers. (El-Gharbia 2016)



13. Determine by drawing the number of weights which must be placed at a distance of one hole of fulcrum to become the lever balance, where the distance between every two holes is 1 cm.

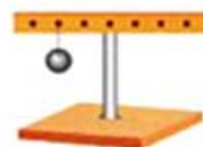


Fig. (a)



Fig. (b)

14. The opposite figure represents a lever.  
(1) What is the type of this lever ?



- (2) The exerted force of the lever equal 200 Newton and the length of its arm is 50 cm. and is affected by a resistance with a value of 500 Newton. Find the value of the arm of the resistance.

(El-Menofia 2016)

15. Study the following figure, then calculate the weight of the rock.



13. Determine which of the following levers conserves effort. Give reason for your answer.



Fig. (a)



Fig. (b)



## Unit One

14. Classify the following tools according to the type of the lever : (Suez 2015)



(1) .....



(2) .....



(3) .....

Determine which of the following levers conserves the effort and give reason.

15. Write your own paragraph on each concept :

The force  $\times$  Its arm = The resistance  $\times$  Its arm

States that

Law of levers

used in

Determining the mechanical purpose of levers

First class levers



(1) .....

(2) .....

Second class levers



Conserve effort

Third class levers



(3) .....



# Timss Questions



1. Ramy rides on a seesaw with his sister Eman and then with his brother Ayman.

Ramy is the same weight as Eman, but Ayman is twice the weight of Ramy.



Ramy

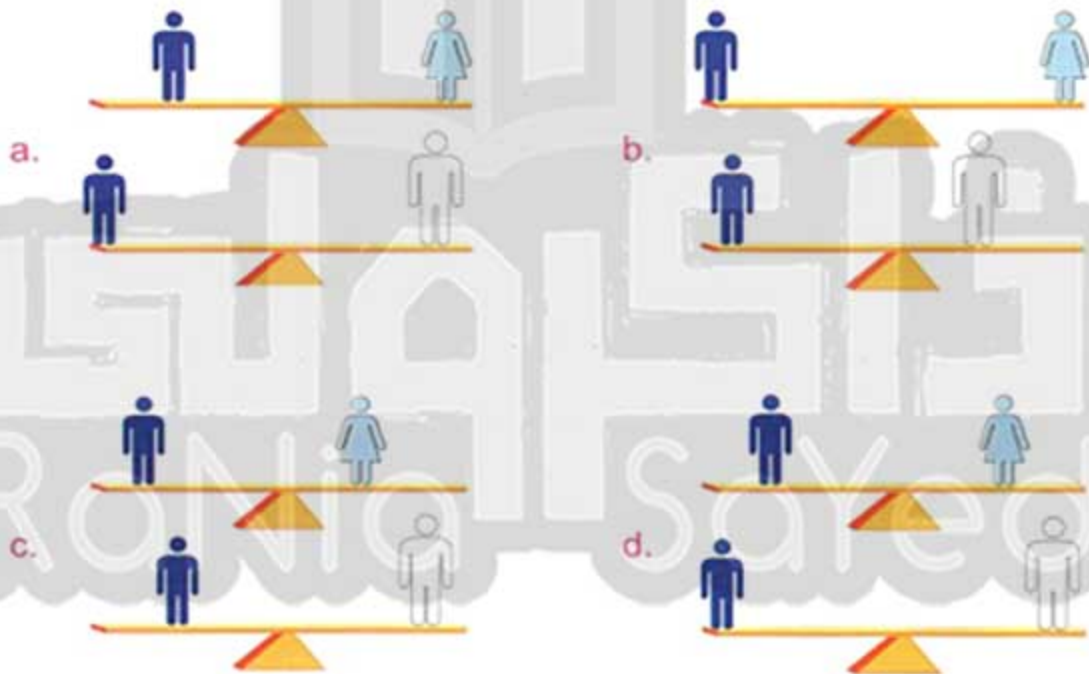


Eman



Ayman

Which figure shows where the children should sit so that Ramy can balance first with Eman and then with Ayman?

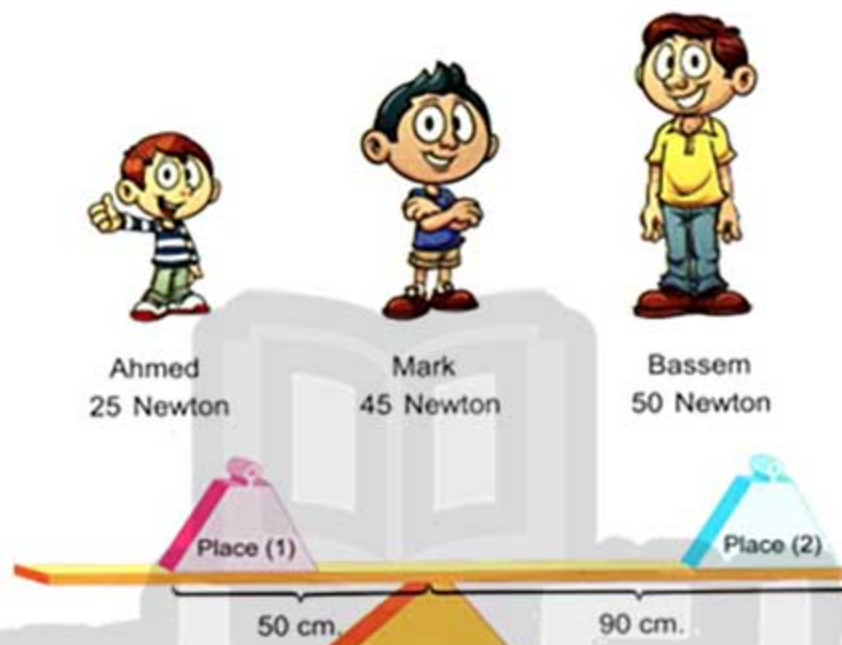


2. If two pupils (A) and (B) sit on a seesaw from its two sides at the same distance away from fulcrum, they found that the seesaw get balanced. If the weight of pupil (A) is 40 Newton, so the weight of pupil (B) is .....
- a. twice the weight of pupil (A).      b. half the weight of pupil (A).  
c. equal to the weight of pupil (A).      d. not equal to the weight of pupil (A).
3. If the distance between resistance force and fulcrum = 5 cm. So to save effort, the distance between effort force and fulcrum must be .....
- a. equal 5.      b. more than 5.      c. less than 5.



## Unit One

4. Ahmed, Mark and Bassem are three friends. Ahmed weighs 25 Newton, Mark weighs 45 Newton, while Bassem weighs 50 Newton.



If they want to make the previous seesaw to get balanced, So ..... must sit in place (1), while ..... must sit in place (2).

الآن



استمتع بمشاهدة شرح الدروس والتجارب والأنشطة التفاعلية على هاتفك الذكي أو جهازك اللوحي عن طريق تحميل تطبيق :

"EL-Moasser science 6<sup>th</sup> prim. T2"



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# UNIT 2

## Electric Energy

### Lessons of the unit :

1. The electric lamps.
2. Dangers of electricity and how to deal with it.



### UNIT OBJECTIVES

By the end of this unit, you will be able to :

- Identify the structure of electric lamps.
- Compare between the ways of connecting electric lamps in series and in parallel.
- Deduce the way to connect electric lamps in the house.
- Identify the dangers of electricity and the precautions in dealing with it in the house.
- Construct experiments to determine some solid materials that are conductors and non-conductors of electricity.



## 1

## LESSON

## The electric lamps

It is known that the Sun is the main source of light.

- But, in the old centuries, man felt that daylight is not enough so, he started to search for artificial light sources such as *Fire torches, candles and oil lamps*.
- After the discovery of electricity, man uses the electric lamps instead of fire torches, candles and oil lamps.
- The electric lamps represent a constant source of light that is **clear, bright and free from smoke, vapour and odor**.



In this lesson, we will study

1

Electric lamps

2

Electric circuits

bright  
electric circuits

لامع fire torches  
الدوائر الكهربائية convert

مشاعل النار  
يحول



## 1 Electric lamps

## Electric lamps

They are tools that convert the electric energy into light energy.

## Types of electric lamps

There are different types of electric lamps, but the most popular of them are :

## The most popular electric lamps

## First : Light bulbs



## Second : Fluorescent lamps



## First

## Light bulbs

- **Thomas Alpha Edison** is an American inventor who invented the light bulb.
- **Uses of light bulbs :**  
Light bulbs are the most popular source of artificial light, where they are used in :



Thomas Alpha Edison



## 1. Lighting houses



## 2. Car lights



## 3. Torches

light bulbs  
popular

مصباح كهربية  
شعبي fluorescent lamps  
inventor

المصابيح الفلوريسنت  
مخترع



### • Structure of light bulb :

To know the structure of the light bulb, do the following activity.



### Activity 1

To know the structure of the light bulb.



#### Step:

Check the light bulb with a magnifying lens, but be careful not to break the lamp.



#### Observation:

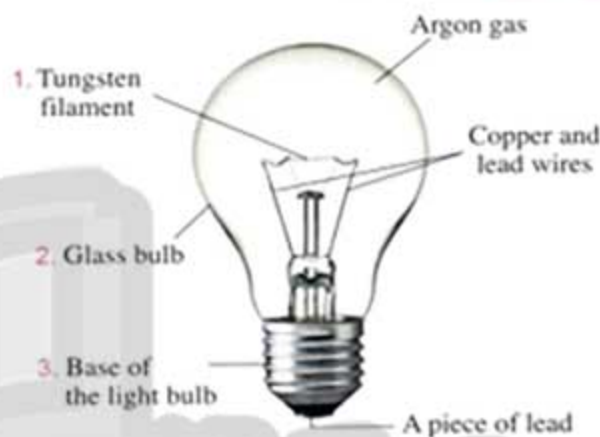
The light bulb consists of different parts.



#### Conclusion:

The light bulb consists of three main parts which are :

1. Filament.
2. Glass bulb.
3. Base of the light bulb.



### Exercise

Complete the following sentences :

1. .... and .... are the most popular types of the electric lamps.
2. .... , ..... and the glass bulb are the main parts of the light bulb.

#### Answer

1. Light bulbs - fluorescent lamps
2. The filament - the base of the light bulb

magnifying lens  
filament  
lead

عدسة مكبرة base  
فتيلة glass bulb  
رصاص

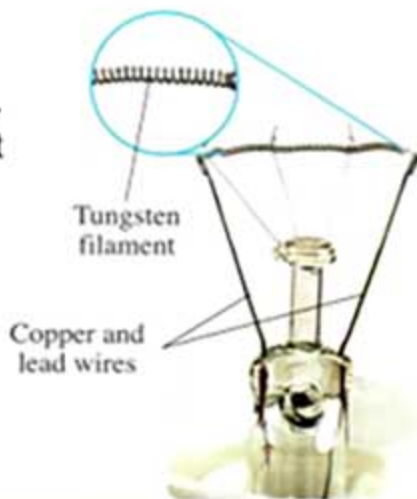
قاعدة  
انتفاخ زجاجي



## 1

## The filament :

- It is a coiled thin wire that is made of tungsten.
- It is connected with copper and lead wires that are connected to the base of the lamp.
- The filament is made of tungsten, because it has a high melting point that prevents the melting of the filament at high temperatures.



## • The function of the filament :

It heats up and emits light when the electric current passes through it.

## • The function of copper and lead wires :

They allow the electric current (electricity) to pass from the base of the light bulb to the tungsten filament .

## 2

## The glass bulb :

- It is made of thin glass.
- Its function :
  - It prevents air from reaching the filament to protect it from burning.
  - It contains one type of inert gases as **argon gas** instead of air.  
(Inert gases are inactive gases as they don't burn and don't help in burning).



## • The function of argon gas :

It protects the filament from burning when it heats up and increases its lifetime.

G.R.

The glass bulb in the light bulb is filled with inert argon gas.

coiled  
inert gas  
electric current

لولبي melting point  
غاز خامل instead of  
التيار الكهربائي lifetime

درجة الانصهار heats up  
بدلاً من inactive  
الغرفة

يسخن  
غير نشط



### 3 The base of the light bulb :

#### • Its functions :

1. It carries the light bulb in an upright position.
2. It connects the light bulb to the electric circuit.

#### • Its types :

There are two types of the bases of the light bulb.



Base of the light bulb

#### The types of bases of the light bulb

are divided into

##### Spiral base

It has a piece of lead to connect the lamp to the electric circuit .



A piece of lead

##### Two side nails base

It has two side nails and two pieces of lead to connect the lamp to the electric circuit .



Two side nails

Two pieces of lead

### Exercise

What is the name of the structure that has these properties :

1. A structure in the light bulb that is made of tungsten. (.....)
2. An inert gas that fills up the glass bulb of the lamp. (.....)
3. A structure in the lamp that carries the light bulb in an upright position. (.....)

#### Answer

1. The filament.
2. Argon gas.
3. The base of the light bulb.

spiral

حلزوني / لولبي upright position

وضع قائم



## Second Fluorescent lamps

### • Uses of fluorescent lamps :

The fluorescent lamps are used for many purposes such as :



1. Lighting houses, and offices



2. Decorating commercial stores



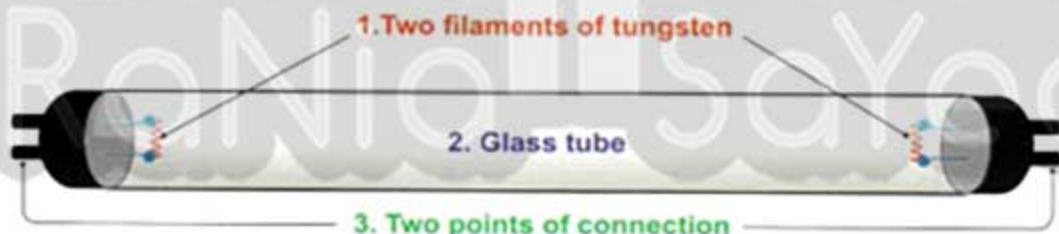
3. Commercial advertisements

### • Structure of fluorescent lamp :

The fluorescent lamp consists of three main parts which are :

#### 1 Two filaments of tungsten

They are found at the two tips of the lamp from inside, where each tip contains **a filament of tungsten**.



#### 2 A glass tube

- It is a vacuumed glass tube that contains inert **argon gas** and a little of **mercury vapour**.
- The inner surface of the glass tube is covered with **a phosphoric material**.

#### 3 Two points of connection

- There are **two points** of connection on each tip of the lamp.
- **Their function :**  
They connect the fluorescent lamp to the electricity.

decorating  
vacuumed

زخرفة commercial stores  
فارغ mercury

المحلات التجارية advertisements  
رأس tip

اعلانات  
قمة / نهاية



## Unit Two

## NOTE

The fluorescent lamp is known as neon lamp, but the inert neon gas is not used inside its glass tube.

## Enrichment information

## Combined fluorescent lamp :

- It is a type of fluorescent lamps.
- It consumes electric current **less** than the light bulbs.
- It stays longer than the ordinary electric bulbs from **8 to 18 times**.
- Its working time is from **8000 to 15000 hours**, while the working time of light bulb is from **750 to 1000 hours**.



Try to answer

Worksheet 3  
in the Notebook.

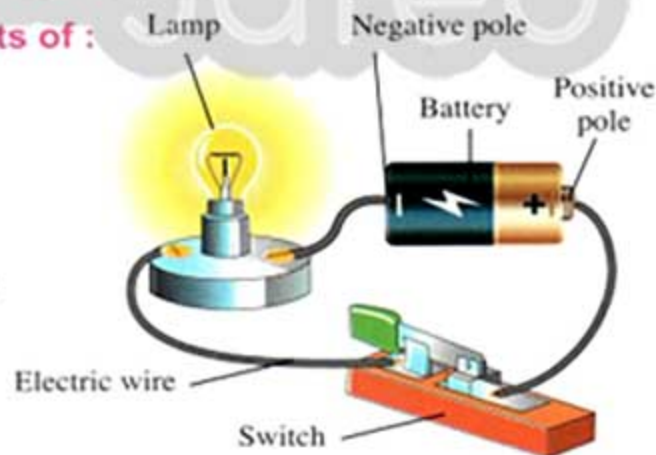
## 2 Electric circuits

## Electric circuit

It is a closed and continuous path through which the electric current passes making a complete cycle.

## •The simple electric circuit consists of :

- **Battery** : It works as a source of electric current in the electric circuit.
- **Electric wires** : They are used to connect the battery to the lamp.
- **Lamp** : Used to indicate the passage of electric current.

combined  
cycleمركب  
دورة consume  
positive poleيستهلك  
قسط مرجب path  
negative poleمسار / طريق  
قطب سالب



- Look at the following two electric circuits [fig. (a) and fig. (b)] and try to find out why the lamp in fig. (a) is lighted, while the lamp in fig. (b) is not lighted.

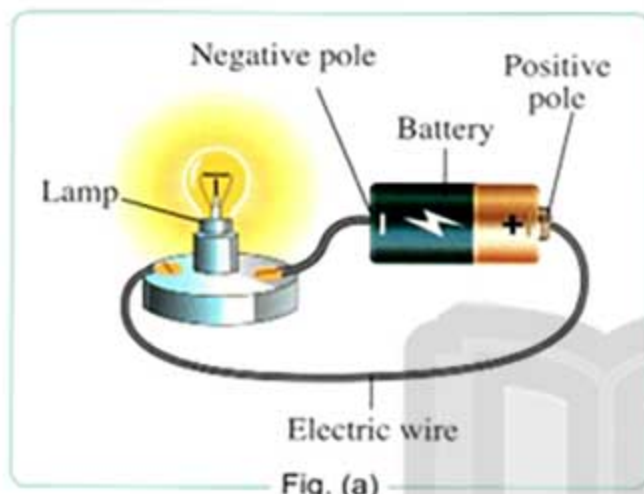


Fig. (a)

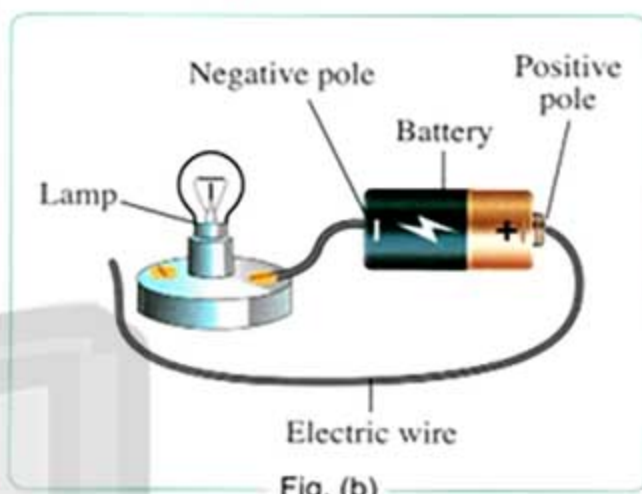
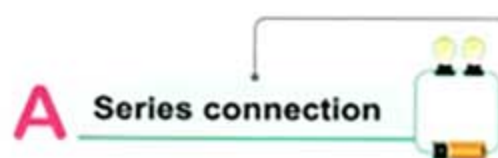


Fig. (b)

- In fig. (a), all the parts of the electric circuit are connected together (a closed circuit), so the electric current passes through the circuit and the lamp lights up.
- In fig. (b), the parts of the electric circuit are not connected together (an open circuit), so the electric current does not pass through the circuit and the lamp doesn't light.

**But,** the electric lamps are connected in the electric circuits by two ways.

#### Methods of connecting the electric lamps in the electric circuits



A Series connection



B Parallel connection

### A Series connection

#### Series connection

It is a way in which the light bulbs are connected one after another in one route.



series connection

توصيل على التوالي parallel connection

توصيل على التوازي



## Unit Two






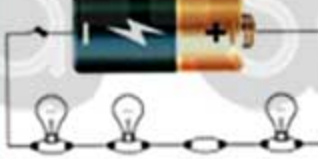
## Activity 2

To show the connection of light bulbs in series.



## Tools:

- Four small lamps with holders.
- Battery.
- Connecting wires.
- Screw driver.

Steps	Figures	Observations
1. Form an electric circuit as shown in fig. (a)	 Fig. (a)	The light intensity of the bulb is strong.
2. Connect another light bulb to the circuit as shown in fig. (b)	 Fig. (b)	The light intensity of the two light bulbs decreases.
3. Repeat the previous step by connecting four light bulbs as shown in fig. (c)	 Fig. (c)	The light intensity of the four light bulbs becomes very weak.
4. Unscrew one lamp from the electric circuit, while the others are still connected as shown in fig. (d)	 Fig. (d)	The other three light bulbs are turned off.



## Conclusion:

## In series connection :

- By increasing the number of the connected **light bulbs**, the lighting (**light intensity**) of the bulbs decreases.
- There is one route for the electric current to pass through the circuit so, **by unscrewing or burning out one bulb**, the electric current doesn't flow.

intensity  
screw driver

شدّة unscrew  
مفتاح route

بفك  
طريق





**When unscrewing one bulb from the opposite figure, the electric current doesn't flow.**

Because in the series connection, there is one route for the electric current to pass through.



## B Parallel connection

### Parallel connection

It is a way in which the light bulbs are connected in branching routes.



### Activity 3

To show the connection of light bulbs in parallel.



#### Tools:

- Four small lamps with holders.
- Battery.
- Connecting wires.
- Screw driver.

#### Steps

1. Connect two light bulbs in an electric circuit as shown in fig. (a)

#### Figures

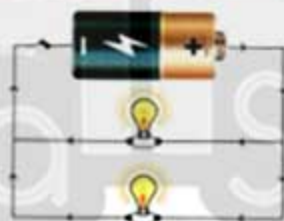


Fig. (a)

#### Observations

The light intensity of the two bulbs is strong.

2. Connect four light bulbs in an electric circuit as shown in fig. (b)

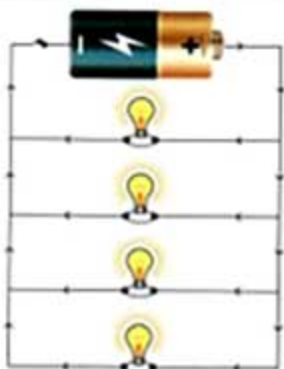


Fig. (b)

The light intensity of the four bulbs is similar to the light intensity of the two bulbs in the previous step.

branching

متفرع



## Unit Two

3. Unscrew one of the bulbs, while the others are connected as shown in fig. (c)

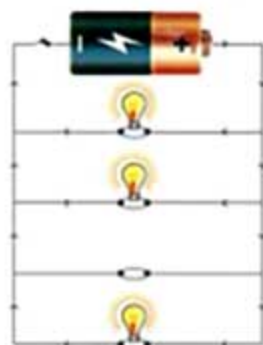


Fig. (c)

The other three lamps are lighted up with the same light intensity.

### Conclusion:

#### In parallel connection :

- By increasing the number of the connected light bulbs, the lighting (light intensity) of the bulbs **remains as it is**.
- There are branching routes for the electric current to pass through the circuit so, by unscrewing one of the lamps, the electric current moves in the other routes and the other lamps in the circuit **do not turn off**.

### Life applications

- All lamps and machines in the house are connected in parallel with the main source of electricity. **G.R.**

To avoid turning off the rest of the lamps when one lamp is turned off or broken.

- Decorative lamps which are used in occasions, celebrations and weddings are connected in a way that insures if one or more lamps are burnt or broken, the other lamps do not turn off. **G.R.**

Because the lamps are connected in parallel.



religious

celebrations دينية

wedding احتفالات

الزفاف



## Comparison between series connection and parallel connection :

Points of comparison	Series connection	Parallel connection
<b>Definition :</b>	It is the way in which the light bulbs are connected one after the other in one route.	It is the way in which the light bulbs are connected in branching routes.
<b>Light intensity :</b>	Decreases by increasing the number of lamps.	Remains constant by increasing or decreasing the number of lamps.
<b>The effect of burning out or unscrewing any of the lamps :</b>	The other light bulbs are turned off.	The other light bulbs are lighted up with the same intensity.

Try to answer

Worksheet 4  
in the Notebook.



# Remember



- The **Sun** is the main source of light on the Earth.
- Electric lamps convert **electric energy** into **light energy**.
- **Thomas Alpha Edison** is an American inventor who invented the light bulb.

## Types of electric lamps are :

1. Light bulbs.
2. Fluorescent lamps.

Points of comparison	Light bulb	Fluorescent lamp
<b>Structure :</b>	1. Glass bulb. 2. Tungsten filament. 3. Bas of light bulb.	1. Glass bulb. 2. Two tungsten filaments. 3. Two points of connection.
<b>Gas used :</b>	Argon gas.	Argon gas and a little of mercury vapour.
<b>Uses :</b>	1. Lighting houses. 2. Car lights. 3. Torches.	1. Lighting houses and offices. 2. Decorating commercial stores. 3. Commercial advertisements.

- **Electric circuit** : Is a closed and continuous path through which the electric current passes making cycle.

## Simple electric circuit consists of :

Battery, electric wires and lamp.


## Methods of connecting the electric lamps in the electric circuits are :

1. Series connection.
  2. Parallel connection.
- All the electric lamps in the house are connected in parallel.



# Questions on lesson one



Questions signed by  have been taken from the school book.

## 1. Choose the correct answer :

- ..... are from the artificial sources that are used before inventing the electric lamps.
  - Candles
  - Oil lamps
  - Fluorescent lamps
  - (a) and (b)
- The electric lamps represent a constant source of light that is .....
  - clear.
  - bright.
  - free from smoke and odor.
  - (a) , (b) and (c).
- The electric lamp converts the electric energy into ..... energy.
  - kinetic
  - light
  - sound
  - magnetic
- All the following are from the components of the light bulb except .....
  - the filament.
  - the glass bulb.
  - two points of connection.
  - the base of the light bulb.
- The filament of the light bulb is made of ..... (Fayoum 2017)
  - tungsten.
  - copper.
  - iron.
  - aluminium.
- The filament of the light bulb is made of tungsten because it has .....
  - low density.
  - low melting point.
  - high melting point.
  - no conductivity. (Kaf El-Sheikh 2017)
- ..... allow the electric current to transfer from the lamp base to the filament.
  - The tungsten filament
  - The argon gas
  - Copper and lead wires in the light lamp
  - The base of the light bulb
- All the following are from the components of the fluorescent lamp except .....
  - tungsten filaments.
  - points of connection.
  - two thick copper wires.
  - glass tube.
- Which of the following gases is found in the fluorescent lamp but not in the light bulb ? ..... (Sharkia & Beheira 2017)
  - Neon.
  - Argon.
  - Mercury vapour.
  - Water vapour.



## Unit Two

10. The glass tube of the fluorescent lamp contains .....  
 a. neon gas. b. argon gas.  
 c. argon gas and a little of mercury vapour.  
 d. hydrogen gas. (El-Menofia & Damietta 2016)
11. The inner surface of the tube of the fluorescent lamp is covered with .....  
 a. mercury. b. a phosphoric material.  
 c. copper. d. tungsten. (Ismailia 2016)
12. There are two points of connection at each tip of the fluorescent lamp .....  
 a. to react with tungsten filament.  
 b. to connect the lamp to electricity.  
 c. to prevent air from reaching the filament.  
 d. (a) , (b) and (c).
13. When the electric lamp connected in parallel with others in the electric circuit, the light intensity .....  
 a. decreases. b. increases. c. doesn't change.  
 d. decreases sometimes and increases another times. (Dakahlia 2017)
14. All the following gases are used in the electric lamps except .....  
 a. argon. b. atmospheric air.  
 c. mercury vapour. d. (a) and (c). (Damietta 2015)
15. We need a light bulb, battery and connecting wires connected together in a closed continuous path to .....  
 a. obtain a continuous electric circuit.  
 b. make a simple electric circuit.  
 c. make the bulb lights up. d. (a) , (b) and (c).
16. When we connect more than one bulb in series to an electric source, the light intensity of the bulbs .....  
 a. decreases. b. increases.  
 c. does not change. d. (a) , (b) and (c). (Aswan 2017)
17. When we connect more than one bulb in parallel to an electric source, the light intensity of the bulbs .....  
 a. decreases. b. increases.  
 c. does not change. d. (a) , (b) and (c). (Matrouh 2017)



18. If we have three light bulbs and we need to get high light intensity, so we must connect them .....
- a. in series. b. in parallel.  
c. (a) and (b). d. without copper wires.
19. When we unscrew a bulb from those that are connected in series, .....
- a. the unscrewed lamp only will be turned off.  
b. all lamps still lighting. c. no lamp will be turned off.  
d. all lamps will be turned off.
20. When an electric lamp which is connected in series with the other lamps burns out, .....
- a. the light intensity decreases. b. the light intensity increases.  
c. all lamps turn off. d. no correct answer.
- (Sharkia & Ismailia 2017)
21. In houses, .....
- a. lamps and all other electric machines are connected in parallel.  
b. lamps are connected in parallel and other machines are connected in series.  
c. lamps are connected in series and all other machines are connected in parallel.  
d. lamps and all other machines are connected in series.
22. The light bulbs are connected in ..... in the house.
- a. parallel b. series c. parallel and series  
d. series in some places and in parallel in the other places.
23. In the decorative lights, if one or more lamps burn out the other lamps do not turn off, because .....
- a. lamps are used in religious celebrations.  
b. lamps are connected in parallel.  
c. lamps are connected in series.  
d. (a) , (b) and (c).

## 2. Choose from column (B) what suits in column (A) :

(A)	(B)
1. Light bulb	a) is in series.
2. Connecting electric lamps in the house	b) is in parallel.
3. The filament of the light bulb	c) changes electric energy to light energy.
	d) made of nichrome wire.
	e) made of tungsten wire.

1. ....

2. ....

3. ....



## Unit Two

3. Put (✓) in front of the correct statement and (×) in front of the incorrect one, then correct it :

1. The Sun is the main source of light on Earth. ( )
2. Candles and oil lamps are artificial light sources, while electric lamp is a natural light source. ( )
3. Electric lamp converts kinetic energy into light energy. ( )
4. The light bulbs are the most popular source of natural light. ( )
5. The light energy is produced from the light bulb when the electric current flows through the glass bulb. ( )
6. Electric bulbs are used in lighting houses. ( )
7. The glass bulb of the electric lamp contains atmospheric air. ( )
8. The swelling (glass bulb) of a light bulb contains oxygen gas. ( )
9. The filament of the light bulb is made of aluminium. (South Sinai 2017) ( )
10. The filament of the electric bulb is made of a metal that has low melting point. (Kafr El-Sheikh 2017) ( )
11. Argon is used instead of air inside the bulb of the electric lamp to protect the filament from burning. ( )
12. The base of the light bulb connects the lamp with electricity. ( )
13. Spiral base has two side nails and two pieces of lead. ( )
14. The spiral base of the light bulb glows due to passing the electric current through it. (Qena 2016) ( )
15. The fluorescent lamp contains one filament of tungsten. (Dakahlia 2017) ( )
16. Fluorescent lamp contains neon gas. ( )
17. Points of connection of fluorescent lamp connect the lamp to electricity. ( )
18. Fluorescent lamps are called neon lamps, because it contains inert neon gas. ( )
19. When the electric circuit is closed, an electric current will pass through it. ( )
20. Electric lamp and a battery are only required to form a simple electric circuit. ( )
21. When we connect light bulbs in series, the lighting of the bulbs decreases when the number of bulbs increases. ( )





22. In parallel electric circuit, there is no branching routes. ( )
23. In series electric circuit, when one light bulb burns out, the other lamps do not turn off. ( )
24. When we connect light bulbs in parallel to an electric source, the light intensity of the bulbs increases by increasing the number of bulbs. ( )
25. While connecting the lamps in parallel, the lamps are connected one after the other. (Giza 2017) ( )
26. Electric lamps are connected in houses in parallel. (Suez 2017) ( )

#### 4. Write the scientific term of each of the following statements :




- Means of converting the electric energy to light energy. ( )
- The main source of light on Earth. ( )
- The scientist who invented the light bulb. (Cairo 2013) ( )
- It is a coiled thin wire made of tungsten in the light bulb. ( )  
(Suez 2017)
- A part of the light bulb that emits light when electric current passes through it. ( )
- A part of the light bulb that is made of thin glass and contains an inert gas. ( )
- An inert gas that is found in the glass bulb of the electric lamp. ( )  
(Dakahlia 2017)
- It carries the lamp in upright position and connects the lamp to electricity. (Gharbia 2017) ( )
- An element that is used in making the filament of the fluorescent lamp. ( )
- A material that covers the inner surface of the glass tube in fluorescent lamps. ( )
- It is a type of electric lamps that's used in houses, offices, decorating commercial stores. (Fayoum 2015) ( )
- A type of lamps their inner surface is covered with phosphoric material. ( )
- It is a closed and continuous path through which the electric current will pass. ( )







## Unit Two

14. It consists of a battery, a lamp, connecting wires and switch. ( ..... )  
(Beheira & El-Minia 2017)
15.  A way in which the light bulbs are connected one after another, where the light intensity of the bulbs decreases by increasing their numbers.  
(El-Menofia & Assiut 2017) ( ..... )
16. A way of connecting the electric lamps in which all the lamps are turned off when one of them burns out.  
(El-Menofia 2016) ( ..... )
17.  The way, where the bulbs are connected in branching routes and the lighting of lamps is not affected by increasing their number.  
(Ismailia & Aswan 2017) ( ..... )
18. A way of connecting the lamps and machines in houses. ( ..... )  
(Aswan 2012)




## 5. Complete the following statements :

1. The ..... is the main source of light on the Earth.
2. The scientist ..... who invented the light bulb. (Beheira & Dakahlia 2016)
3. .... and ..... are from the artificial light sources.
4. .... represents a clear and bright source of light that is free from smoke and vapour.
5. Electric lamps convert ..... energy into ..... energy.
6. Electric lamps emit light when ..... passes through them.
7.  Some of the types of electric lamps are ..... and .....
8. Light bulbs are used for many purposes such as ..... , car lights and .....
9.  The light bulb consists of ..... , ..... and .....
10.  The filament of the light bulb is made of ..... , because it has high .....  
(El-Menofia & Ismailia 2017)
11. The light bulb contains inert ..... gas. (Fayoum 2015)
12. The glass bulb of the light bulb is filled with ..... gas instead of .....  
(Gharbia 2017)
13. In the light bulb, copper and lead wires allow the electric current to pass from ..... to .....
14. There are two types of lamp bases which are ..... base and ..... base.







15. The glass bulb protects the filament from burning, as it contains ..... gas to increase the lifetime of the filament.
16. .... base has a piece of lead, while ..... base has two pieces of lead.
17. .... lamps are used in commercial advertisements and lighting houses.
18. The fluorescent lamp consists of ..... and ..... (Gharbia 2017)
19.  The fluorescent lamp contains the inert ..... gas. (Giza & Beni-Suef 2017)
20. The inner surface of the tube of the fluorescent lamp is covered with ..... material. (Menofia 2015)
21.  The simple electric circuit consists of ..... and ..... (Damietta 2017)
22. The electric circuit is ..... when all its parts are connected together. (Alex. 2016)
23.  ..... and ..... are two ways of connecting electricity.
24. When connecting many light bulbs in series, the light intensity of the bulbs .....
25. The lighting of the light bulbs does not change if they are connected in the circuit in .....
26. The electric current in the ..... connection has only one route, while it has many branching routes in the ..... connection.
27.  When connecting light bulbs in ....., the light intensity of the lamps decreases by ..... their numbers.
28. All light bulbs are connected in ..... in the house. (Kafr El-Sheikh 2017)

## 6. Correct the underlined words in the following statements :



1.  The electric lamp converts the electric energy into kinetic energy. (El-Menofia 2017) (.....)
2. Light bulbs are natural light sources. (.....)
3. Galileo is an American inventor who invented the electric lamp. (.....)
4.  The filament of the light bulb is made of carbon. (Assiut 2017) (.....)
5.  The electric lamp contains hydrogen gas. (Port Said 2017) (.....)






## Unit Two

6. The **filament** of the light bulb connects the lamp to the electricity. ( ..... )
7. Fluorescent lamp contains the inert **neon** gas. (Beheira 2016) ( ..... )
8. The tungsten element has a **low** melting point. ( ..... )
9.  There are two connecting points at each end of the **light bulb**. (Dakahlia 2016) ( ..... )
10. The inner surface of the tube of the fluorescent lamp is covered with a **carbonic** material. ( ..... )
11. The simple electric circuit consists of battery, lamp and **an insulator** to connect the battery with the lamp. (Ismailia 2016) ( ..... )
12. The electric circuit is **open** when all its parts are connected and the electric current passes through it. ( ..... )
13.  To connect lamps in **parallel**, they are connected one after another. ( ..... )
14.  The lamps in the electric circuit continue to work when connected **in series** if a lamp is damaged. ( ..... )
15. There **are different routes** for the electric current to pass through a circuit connected in series. ( ..... )
16. When we connect more than one bulb in series to the electric source, the lighting of the bulbs **increases**. ( ..... )
17. The lamps in the decorative lights are connected **in series**. ( ..... )
18.  The electric lamps are connected in houses **in series**. (Red Sea 2016) ( ..... )



## 7. Give reasons for the following :

1.  The filament of the light bulb is made of tungsten. (Alex. & Dakahlia 2017) ( ..... )
2.  The swelling of the electric lamp contains an inert gas instead of air. ( ..... )
3. The filament of the electric lamp is the most important part in the light bulb. ( ..... )
4. Copper and lead wires are connected to the filament from one end and connected with the base of the bulb from the other end. ( ..... )




5. The base of the light bulb is made of a metal not plastic.
6.  There are two pieces of lead in the base of the light bulb. (Red Sea 2016)
7. The fluorescent lamps are very important in our life.
8. The glass tube of the fluorescent lamp is filled with argon gas.
9.  There are two points of connection at each tip of the fluorescent lamp. (El-Menofia 2016)
10.  The light bulbs are connected in the house in parallel. (El-Menofia 2017)
11. In the decorative lights, if one or more lamps burn out, the other lamps don't turn off.
12. Decorative lamps are connected in parallel not in series. (Sohag 2017)

### 8. What happens if ... ?

1. There is no glass bulb around the parts of the electric lamp. (Cairo 2017)
2.  There is air inside the light bulb.
3. The bulb of electric lamp is filled with oxygen.
4.  You make the filament of the light bulb from iron. (Kalyoubia 2015)
5. The two metallic pieces are not found in the base of the light bulb. (El-Menofia 2017)
6. There is no battery in the electric circuit.
7. Opening the electric circuit by using the electric switch.



## Unit Two

8. Many light bulbs are connected in series in an electric circuit.  
.....
9. Many light bulbs are connected in parallel in an electric circuit. (Cairo 2016)  
.....
10. Turning off one light bulb in an electric circuit contains many lamps connected in series. (Dakahlia 2017)  
.....
11. One of the electric lamps burns out, while it is connected in parallel with the others. (Kafr El-Sheikh 2017)  
.....
12.  The electric lamps in the house are connected in series. (El-Minia 2017)  
.....
13. The electric current passes through the tungsten filament in the light bulb.  
.....

## 9. What is meant by ... ?

1. Electric lamp.  
.....
2. Electric circuit.  
.....

## 10. What is the function (use) of ... ?

1. The filament of tungsten in the light bulbs. (Giza & Damietta 2017)  
.....
2. The base of the light bulb. (Beheira 2016)  
.....
3. The two copper wires in the light bulb.  
.....
4. The inert argon gas in the fluorescent lamp. (Alex. 2017)  
.....
5. The points of connection in the fluorescent lamp.  
.....
6. The battery in the electric circuit.  
.....



- (Fayoum & Sohag 2017)

1.  Connecting electric lamps in series and connecting in parallel (with respect to : Light intensity – Removing one of the lamps from the connection).

(Boheira 2017)

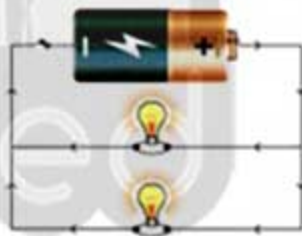
2.  The light bulb and the fluorescent lamp with respect to : Structure.

3. The sources of artificial light and the sources of natural light with respect to : Examples.

1. The opposite figure shows the connection of electric bulbs in .....  
a. series. b. parallel.  
c. one of them in series, but the other in parallel.

(Ismailia 2015)

2. If one of the two electric bulbs is damaged, the lighting of the other .....
- a. will continue.                      b. will turn off.



**13.** If you have a battery, three electric light bulbs and connecting wires. Show with drawing only how you can use these tools to form :

1. Series electric circuit.

- ## 2. Parallel electric circuit.



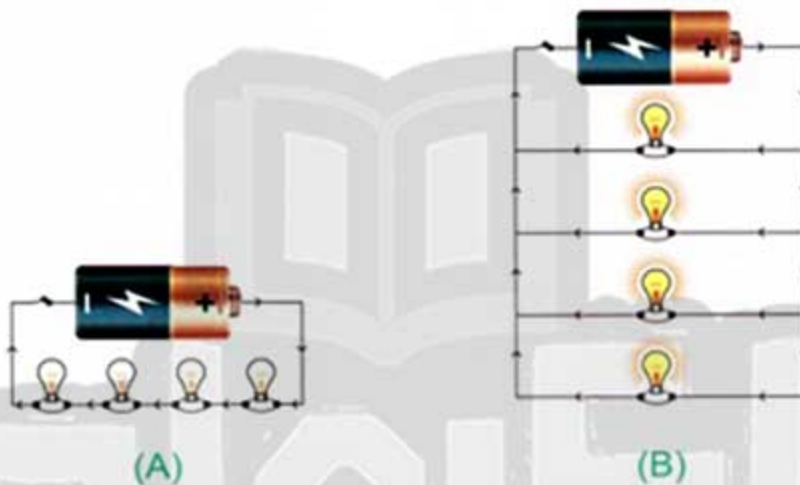
## Unit Two

14. The following figures represent two electric circuits (A) and (B).

Answer the following questions :

(Port Said 2017)

1. Mention the way in which the light bulbs are connected in each circuit.
2. Which way (A) or (B) could be used to connect the electric lamps in the house ? Mention the reason.



15. Look at the opposite figure, then answer :

(A) What is the name of this figure ?

(B) Label the following figure : (Giza & Beheira 2017)

- 1 .....
- 2 .....
- 3 .....
- 4 .....
- 5 .....
- 6 .....



(C) Why is the glass bulb of the electric lamp filled with argon gas ?



**16** Look at the opposite figure, then label it.

- ① .....  
 ② .....  
 ③ .....



**17** Look at the figure in front of you, then answer :

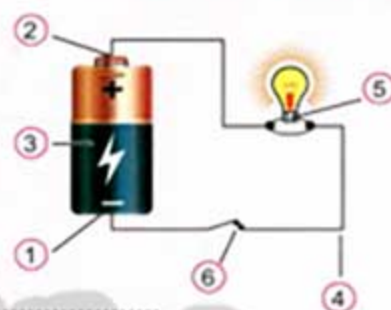
(Kafr El-Sheikh 2016)

- In this case, the simple circuit is ..... , so the electric current passes through.
- In case of any of these parts is not connected, the ..... does not pass through the circuit.

3. Write the labels.

(Damietta 2016)

- ① ..... ② .....  
 ③ ..... ④ .....  
 ⑤ ..... ⑥ .....



4. The part no. (6) should be ..... in order to the light bulb glows.  
 a. closed      b. opened      c. unimportant



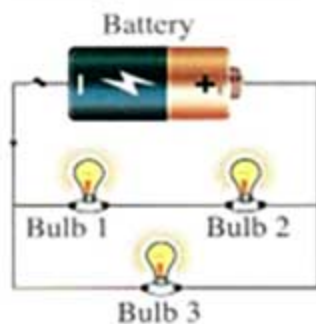
# Timss Questions



1. Three identical light bulbs are connected to a battery as shown in the diagram.

The arrow indicates the direction of the current flow.

Direction of current flow



- If the bulb no. 1 was disconnected, what happen to the remaining bulbs ?

- a. bulbs 2 , 3 still light.      b. bulb 2 only lights.  
c. bulb 3 only lights.      d. bulb 2, 3 will put off.

2. Three groups of information listed in 3 columns :

A

- Piece of lead
- Argon gas
- Glass bulb
- Tungsten filament
- Copper and lead wires

B

- Inert argon gas
- Mercury vapour
- Phosphoric material
- 2 points of connection

C

- Battery
- Switch
- Lamp
- Electric wires

Choose the correct answer :

- a. Column (A) is structure of light bulb and column (C) is structure of fluorescent lamp.  
b. Column (A) is structure of battery and column (B) is structure of fluorescent lamp.  
c. Column (B) is structure of fluorescent lamp and column (C) is structure of electric circuit.  
d. Column (A) is structure of electric circuit and column (C) is structure of light bulb.

3. In science lab. , students form an electric circuit with 4 lamps connected in series. Adel suggests to increase the number of lamps in series to obtain more light intensity than that of the 4 lamps.

Do you agree with Adel's suggestion ?

(Tick one box)

Yes

No

Explain your answer.



4. Look at the following circuits, then answer :

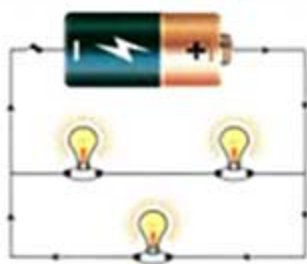


Fig. (a)

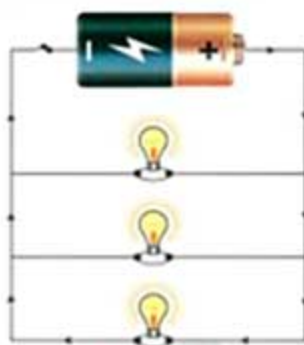


Fig. (b)



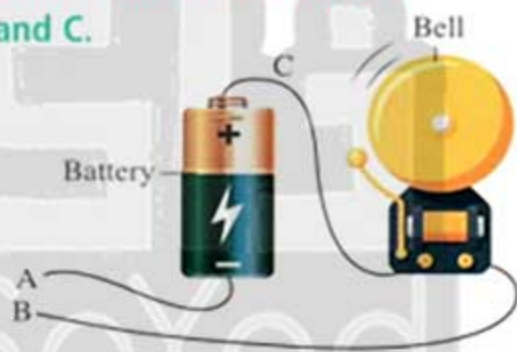
Fig. (c)

1. Name one of the above circuits that has electric lamps connected in series ?
2. In which circuit do the bulbs glow most brightly ?
3. In which circuit do the bulbs glow least brightly ?

( ..... )  
( ..... )  
( ..... )

5. The diagram bellow shows part of an electrical circuit that includes a battery, a bell and three wires labeled A, B and C.

The bell does not make a sound. Explain what needs to be done to the circuit so that the bell will make a sound ?



6. Put on the figure, the letters and the name of the part that represent the answer of the following questions :

- a. It prevents air from reaching the filament to protect it from burning.
- b. It heats up and emits light when the electric current passes through.
- c. It carries the light bulb in an upright position.
- d. It protects the filament from burning when it heats up and increases its lifetime.
- e. They allow the electric current to pass from the base of the light bulb to the tungsten filament.





## 2

## LESSON

## Dangers of electricity and how to deal with it

- A lot of energies in our life have benefits and dangers if we use them without precautions.
- Electricity is one of the energies that we can't imagine our life without it, so it also has benefits and dangers.

## First

## Benefits or uses of electricity in our daily life

1

It is used to cook food and preserve it cold.



2

It is used to light our houses, factories, streets .... etc.



3

It is used in operating some machines such as radios, televisions, washing machines, toys .... etc.



**But,** before studying the dangers of electricity and the precautions to deal with it, we have to know what is meant by electric conductors and electric insulators.

dangers  
imagine

أخطار deal with  
يتخيل preserve

يتعامل مع precautions  
يحفظ

احتياطات



## Electric conductors and electric insulators



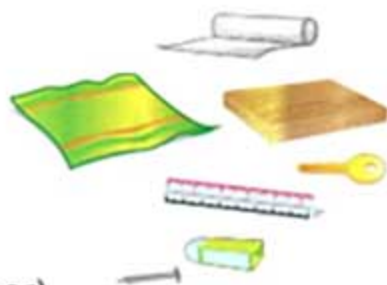
## Activity

To classify substances into electric conductors and electric insulators :



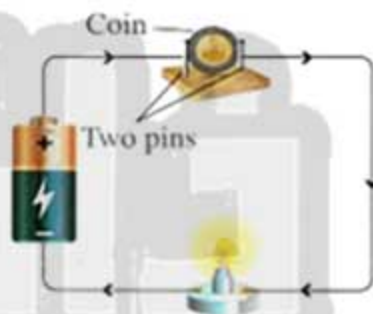
## Materials:

- Battery.
- Connecting wires.
- Two pins.
- Different materials (as key, nail, coin, aluminium foil, wood, clothes, plastic ruler, eraser).
- Small light bulb.
- A piece of cork.



## Steps:

1. Form an electric circuit as shown in the opposite figure.
2. Place the metallic coin between the two pins, to connect them together forming a closed electric circuit.



## Observation:

The light bulb will light up.

3. Repeat the previous step by using the other materials.



## Observations:

1. The light bulb will light up in the case of coin, key, nail and aluminium foil.
2. The light bulb will not light up in the case of plastic ruler, eraser, wood and clothes.



## Conclusion:

Materials are divided according to their conductivity of electricity into electric conductors and electric insulators

insulator  
conductivity

عازل eraser  
التوصيل conductor

معا  
موصّل



## Unit Two

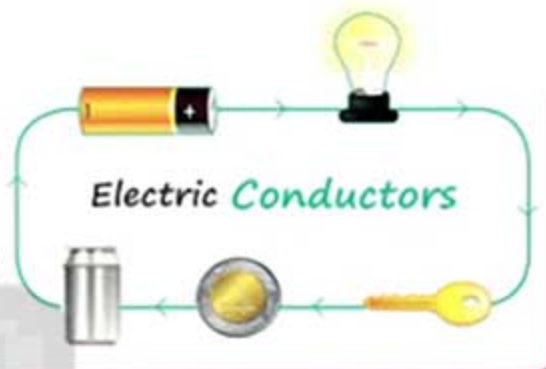
## Electric conductors

They are materials that allow the flow of electricity through them.

## Examples :

Water and all metals such as iron , copper, aluminium, lead, ....etc.

When the **electric conductors** are connected to the electric circuit, they **close** the circuit and allow the electric current to flow through the circuit.



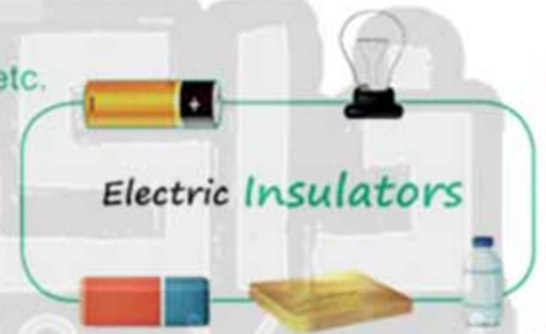
## Electric insulators

They are materials that do not allow the flow of electricity through them.

## Examples :

Wood, plastic , rubber , clothes, glass, ..... etc.

When the **electric insulators** are connected to the electric circuit, they make the circuit **open**, so the electric current cannot flow through the circuit.



## NOTES

- The electric cables (wires) are made of copper which is an electric conducting material.
- The electric cables are covered with plastic which is an electric insulating material in order to avoid the dangers of electricity when we deal with the electric cables.

## Question

*Classify the following materials into electric conductors and electric insulators :*

Wooden ruler - iron rod - copper coin - plastic button - a piece of wool - aluminium foil.

electric power stations    محطات القوى الكهربائية    cables    أبراج  
towering    متخيم    poles

كابلات    hanged    معلق  
أعمدة    metals    المعادن

معلق  
المعادن



**Enrichment information**

- Electricity reaches our houses and factories from electric power stations through hanged on high towering poles.
- These cables are covered with insulating materials to prevent electric current from reaching the towering poles.

**Second Dangers of electricity**

Electricity is considered safe if it is handled cautiously, but it causes a lot of dangers if we use it in an improper way (neglect the safety precautions).

**Dangers resulted from the improper use of electricity are**

**Direct injuries**

include

1



Fires resulting from electricity (electric fires)

2



The electric shock

3



Burns resulting from the electric current (electric burns)

**Indirect injuries**

Like injuries that result from falling from top of a ladder due to an electric shock.

**Direct injuries****1 Fires resulting from electricity (Electric fires) :****Electric fires**

They are fires that occur as a result of an increase in the temperature of the electric machines.

handled

استعملت cautiously

بحرص neglect

بسهولة

safety

أمان improper

خاطئ injuries

إصابات

electric shock

الصدمة الكهربائية



## Unit Two

## The reasons of the electric fires

1. Placing an electric machine that generates heat (as electric iron, electric heater and spot light) close to some flammable materials (as furniture, curtains, carpets, clothes).



2. Plugging more than one machine to one socket that causes electric overload, so the wires heat up causing fires.

3. Not disconnecting the electric current from the electric machines that generate heat after use which causes an increase in the temperature of the machine, causing fires.



G.R.

- **Plugging more than one machine to one socket causes electric fires.**  
Because it causes electric overload, so the wires heat up causing fires.
- **Not disconnecting the electric current from the electric machine after use causes fires.**  
Because this increases the temperature of the machine causing fires.

*What is the difference between regular fires and fires caused by electricity ?*

Electric fires	Regular fires
<ul style="list-style-type: none"> <li>- Sand is used to put out electric fires. <b>G.R.</b></li> <li>- Water is not used to put out electric fires Because water is a good conductor of electricity, so it will increase the fire and harm the rescuers.</li> </ul>	<ul style="list-style-type: none"> <li>- Water is used to put out regular fires.</li> </ul>

Try to answer

Worksheet 5  
in the Notebook.carpet  
disconnecting  
rescuerسجادة  
فصل  
المنفذ  
plugging  
flammableتوصيل  
قابل للإشتعال  
electric overload  
curtainsزيادة تحميل كهربى  
سائر



## 2 The electric shock :

### Electric shock

It is one of the dangers of electricity that occurs due to passing the electric current through the human body.

- The human body is a **good conductor** of electricity, because **70%** of the body contains water.
- The electric shock happens when your body is a **part of a closed electric circuit**, where the electric current flows from a part of your body and comes out from another part.
- In many cases, **electric shock causes death**.



### • The harms of the electric shock depend on :

- a. The **strength** of the electric current that passes through the human body.
- b. The **time taken** by the electric current to pass through the human body.

### The reasons of the electric shock

1. A part of your body touches a non insulated wire that has an electric current and another part of your body touches the ground.



2. A part of your body touches a non insulated wire that has an electric current while, another part of your body touches a material conducting electricity and connected to the ground.

3. You touch two non insulated wires that have electric current.



non insulated

غير معزول strength

شدة



## Unit Two



### Life issues : First aid when accidents occur as a result of the electric current :

- 1 Insulate the injured from the electric current by disconnecting electricity or pushing him with a piece of wood or plastic which are bad conductors of electricity.
- 2 Call the physician immediately.
- 3 Open up the tight clothes of the injured to facilitate his breathing.
- 4 Maintain the heart beats of the injured by pressing on the chest with the palms of the hand.
- 5 If the injured cannot breathe, start artificial respiration immediately.



Pressing on the chest with palms

### 3 Burns resulting from the electric current (Electric burns) :

#### Electric burns

They are burns that result from electricity and cause the damage of the body tissues.

#### The reasons of the electric burns

1. A part of your body touches a source of electric current directly, so in this case, the electric burns happen as a result of the electric shock.



2. A part of your body touches fire or spark resulting from the electric fire.

3. A part of your body touches an electric machine that generates heat as electric iron, electric heater ... etc.



first aid  
facilitate

اسعافات أولية physician  
يسهل palm

فورا immediately  
كف اليد spark

في الحال  
شرارة



## Precautions in dealing with electricity

1

Do not place flammable materials (as furniture, curtains, clothes, paper) close to the electric machines that generate heat as electric iron and electric heater.



2

Do not place several connections in the same socket.



3

Do not insert a metallic object in the socket (as nail, metallic wire or non insulated screwdriver).



4

Do not touch the electric machines that are connected to the electric current with wet hand.



5

Do not play with the electric connections.



electric connections الوصلات الكهربائية insert إدخال



## Unit Two

6

Do not try to fix or clean any electric machine, while being connected to the electric current.



7

Do not place the electric wires extending on the ground, so no one trips on them while walking.



8

Do not leave an electric machine that generates heat connected to the electric current while taking a bath.



9

Do not leave the wires naked and not insulated.



10

Place a piece of plastic in the socket to prevent inserting another body in it.



## Try to answer

- Worksheet 6
- General exercise of the school book on Unit 2
- Model exams on Unit 2 in the Notebook.

trip

naked يتعثر

عارية



# Remember



- Materials are divided according to their conductivity of electricity into electric conductors and electric insulators.


Electric conductors	Electric insulators
They are materials that allow the flow of electricity through them.	They are materials that do not allow the flow of electricity through them.
Water and all metals (such as iron, copper, aluminium, lead ... etc).	Wood, plastic, rubber, glass, clothes ... etc.

- Dangers resulted from the improper use of electricity are :**
  - Indirect injuries : Like injuries that result from falling from top of a ladder due to an electric shock.
  - Direct injuries : Include electric fires, electric shock and electric burns.
- Electric fires :** They are fires occur as a result of increasing in the temperature of the electric machines.
- Electric shock :** It is one of the dangers of electricity that occurs due to passing the electric current through the human body.
- Electric burns :** They are burns that result from electricity and cause the damage of the body tissues.



# Questions on lesson two



Questions signed by  have been taken from the school book.

## 1. Choose the correct answer :

- In our daily life, electricity can be used in .....  
 a. cooking and preserving food.      b. lighting houses and factories.  
 c. operating some machines.      d. (a) , (b) and (c).
- ..... is a good conductor of electricity. (El-Menofia & Aswan 2017)  
 a. Wood      b. Iron      c. Plastic      d. Glass
- All the following materials allow the flow of the electric current except ..... (Boheira 2017)  
 a. iron.      b. copper.      c. rubber.      d. aluminium.
- All the following are electric insulators except .....  
 a. glass.      b. rubber.      c. wood.      d. copper.
- ..... is a bad conductor of electricity. (Boheira 2016)  
 a. Aluminium      b. Copper      c. Iron      d. Plastic
- Materials that don't allow the flow of electricity through them are called .....  
 a. electric conductors.      b. electric burns.  
 c. electric insulators.      d. electric fires.
- Materials that allow the flow of electricity through them are .....  
 a. electric conductors.      b. electric insulators.  
 c. electric shocks.      d. electric fires.
- Dangers of electricity include .....  
 a. electric fires.      b. electric shock.  
 c. electric burn.      d. (a) , (b) and (c).
- All the following are from the direct injuries except .....  
 a. fires resulting from electricity.      b. falling from the top of a ladder.  
 c. the electric shock.      d. electric burns.
- Increasing the temperature of the electric machines causes .....  
 a. electric shock.      b. electric burns.  
 c. electric fires.      d. (a) , (b) and (c).
- Plugging many appliances (machines) to one socket may cause ..... (Gharbia 2017)  
 a. electric overload.      b. heating up of wires.  
 c. fires.      d. (a) , (b) and (c).



12. Water cannot be used to put out electric fires, because .....
- it is a good conductor of electricity.
  - it is a bad conductor of electricity.
  - it may evaporate.
  - it is not cold.
13. .... occurs due to passing the electric current through the human body.
- Electric shock
  - Electric fire
  - Electric burn
  - Electric overload
- (Giza 2015)
14. The harms resulting from the electric shock depend on .....
- the time taken by the current to pass through the human body.
  - the strength of the electric current passing through the human body.
  - the heavy clothes that covered the human body.
  - (a) and (b).
15. The electric shock may cause .....
- electric fires.
  - electric overload.
  - electric burns.
  - electric current.
16. Which of the following is (are) from the reasons of the electric burns ? .....
- Your body touches an electric machine that generates heat.
  - Your body touches an insulated wire.
  - Your body touches spark that results from an electric current.
  - (a) and (c).
17. To avoid the occurrence of electric shock, you should not .....
- touch the naked wires.
  - touch electric machines with wet hand.
  - put metallic objects in the electric socket.
  - (a) , (b) and (c).
18. Which of the following is from the precautions in dealing with electricity ? .....
- Place several connections in the same socket.
  - Play with the electric connections.
  - Don't clean any electric machine, while being connected to the electricity.
  - Place the flammable materials as curtains close to the machines that generate heat.



## Unit Two

19. The electric wires are made of .....  
 a. glass.                      b. plastic.                      c. rubber.                      d. copper.
20. Electric wires must be covered with ..... (Cairo 2017)  
 a. copper.                      b. plastic.                      c. iron.                      d. lead.

**2. Put (✓) in front of the correct statement and (x) in front of the wrong one, then correct it :**

1. Electricity is a useful form of energy, but it is dangerous. ( )
2. Plastic is a good conductor of electricity. (Red Sea 2017) ( )
3. Iron, aluminium and copper are considered as electric conducting materials. ( )
4. Wood and plastic allow the flow of electricity through them. ( )
5. When putting a piece of plastic in an electric circuit, the electric current passes. ( )
6. Electric insulators allow the flow of the electric current through them. ( )
7. Electric fires, electric shock and electric burns are from the dangers of electricity. ( )
8. Electric shock occurs as a result of passing an electric current through the human body. (Sohag & South Sinai 2017) ( )
9. The human body is an electric insulator. ( )
10. Touching a naked wire that has an electric current causes electric fire. ( )
11. There is no danger when touching an electric machine with wet hand. ( )
12. Fires resulted from electricity are extinguished by water. (Aswan 2017) ( )
13. Electric fires occur as a result of the increase in the temperature of the electric machines. ( )
14. You must avoid placing flammable materials close to electric machines that generate heat. ( )
15. The harms of the electric shock depend only on the time taken by the electric current to pass through the body. ( )
16. Touching spark resulted from the electric fire causes electric shock. ( )
17. If the injured with an electric shock can't breathe, start artificial respiration immediately. (Sohag 2015) ( )



18. A wood bar is used to push the injured person caused by electric accidents. ( )
19. Electric fires cause damage of the body tissues. (Fayoum 2015) ( )

### 3. Write the scientific term of each of the following :








- Materials that allow the electric current to pass through them. (Giza & Kafr El-Sheikh 2017) ( )
- Materials that don't allow the electric current to pass through them. (Suez & Aswan 2017) ( )
- A form of energy that is used in operating some machines as television and washing machines. ( )
- Fires occur as a result of the increase in the temperature of the electric machines. (Giza & Sharkia 2017) ( )
- An electric danger occurs when placing flammable materials near to electric machines that generate heat. ( )
- The material that should not be used to put out electric fires. ( )
- The material that is used in putting out electric fires. ( )
- A danger of electricity that happens when plugging more than one machine to one socket. ( )
- One of the dangers of electricity occurs as a result of the passage of the electric current through the human body. (Port Said 2017) ( )
- A danger that occurs when a part of your body touches a wire that has an electric current, but the other part touches a material that is a good conductor of electricity. ( )
- One of the dangers of electricity that causes the damage of the tissues of the body. (Fayoum & Assiut 2017) ( )

### 4. Complete the following statements :

- Electricity is used to light ..... and .....
- Electricity is used to operate some machines such as ..... and .....
- Materials are classified into ..... and ..... according to their conductivity of electricity.
- Materials that allow the flow of electricity through them are called ..... (Cairo 2017)
- ..... and ..... are examples of materials that are electric conductors. (Sharkia 2017)



## Unit Two

6. Iron is considered as an electrical ..... , while wood is considered as an electrical .....
7. Materials that don't allow the passage of electricity through them are called .....
8.  ..... and ..... are from the examples of the electric insulators.
9. Metallic materials are considered from the electric ..... , while glass and rubber are considered from the electric ..... (Ismailia 2017)
10. There are two types of injuries resulting from the improper use of electricity which are ..... and ..... (Beheira 2017)
11.  ..... and ..... are some of the dangers of electricity.
12. .... and ..... are from the direct injuries that resulted from the improper use of electricity. (Aswan & Matrouh 2017)
13. Increasing the temperature of the electric machines may cause .....
14. Placing flammable materials near an electric heater leads to .....
15. Plugging more than one machine to one socket causes ..... that leads to .....
16.  ..... and ..... are some of the causes of the electric fires.
17. Connecting an electric iron to the electric current, then put curtains close to it causes .....
18. Impure water cannot be used to put out the fires resulting from ..... (Cairo 2016)
19. We can put out ..... fires by using water, while we can put out electric fires by using .....
20.  You cannot put out the electric fires with water, because water is .....
21. .... results from passing an electric current through the human body. (Kafri El-Sheikh 2017)
22.  The electric shock occurs as a result of passing ..... through the human body. (North Sinai 2017)
23.  The harms resulting from the electric shock depend on ..... and ..... (Dakahlia 2017)
24. .... occurs when your body is a part of a closed electric circuit.
25.  The body burns resulting from the electric current lead to .....




26. ..... and ..... are some of the causes of the burns that resulted from electricity. (Sohag 2016)
27. ..... and ..... are from the precautions to deal with electricity.
28. We should not touch any electric machine with ..... hand.
29. We should not touch the ..... parts of the electric wires.
30. We should place a piece of ..... in the electric socket.
31. We should not place the flammable materials such as furniture and ..... close to electric machines that generate ..... such as ..... and electric iron.
32. Electric cables (wires) are covered with ..... materials.

### 5. Give reasons for the following :



- Electric energy is very necessary in our daily life.  
.....  
.....
- If we insert an iron nail in a simple electric circuit, the electric current will pass through it.  
.....  
.....
- If we insert a piece of wood in a simple electric circuit, the electric current will not pass through it.  
.....  
.....
- Aluminium is an electric conductor.  
.....  
.....
- Plastic is considered as an electric insulator.  
.....  
.....
- Not placing flammable materials close to the electric machines that generate heat.  
.....  
.....
- Plugging more than one machine to one socket causes electric fires. (Gharbia 2016)  
.....  
.....
- We must disconnect the electric current from electric machines that generate heat after use.  
.....  
.....
- Water is not used to put out electric fires. (Beheira & Dakahlia 2017)  
.....  
.....



## Unit Two

10.  Not placing metal things inside the socket.  
.....
11. Placing a piece of plastic in the socket.  
.....
12. Pushing the injured by anything that is non-conducting of electricity such as a piece of wood. (Red Sea 2016)  
.....
13. The electric heater must not be placed close to furniture or rugs. (Cairo & Qena 2016)  
.....
14. We must not touch any electric machine with a wet hand.  
.....
15. Avoid fixing and cleaning any electric machine, while it is connected to the electric source.  
.....
16. The electric cables are covered with insulated materials. (Ismailia 2016)  
.....
17. Electric wires are made of copper.  
.....

## 6. Correct the underlined words :




1.  Wood is considered a good conductor of electricity. (.....)
2. Copper and iron are electric insulators. (.....)
3.  The electric fire occurs due to the passage of the electric current through the human body. (Assiut & Matrouh 2017) (.....)
4. Touching the naked wires that has an electric current leads to electric fire. (.....)
5. Electric insulators are materials that allow the flow of electric current through them. (.....)
6. Electric conductors make the circuit open when they are connected to the circuit. (.....)
7. Fires resulted from electricity are extinguished by water. (.....)

(Sharkia 2017)



8. The human body is a good conductor of electricity as it contains gases.  
(Alex. & Beheira 2017) (.....)
9. Impure water is one of the liquid materials that is bad conductor of electricity.  
(Menofia 2016) (.....)
10. Pushing the injured by anything that is non-conducting of electricity such as a piece of copper.  
(Beheira 2016) (.....)
11. Insulators cause the damage of the tissues of the human body.  
(.....)
12. Plugging more than one machine to one socket causes electric burns.  
(.....)
13. Touching the spark that resulted from electric fires causes electric shock.  
(.....)


### 7. What happens if ... ?

1. A piece of copper is inserted in a closed simple electric circuit.  
.....
2. A piece of glass is inserted in a closed simple electric circuit.  
.....
3.  You place the electric heater close to furniture or rugs.  
(El-Minia 2017)  
.....
4. Plugging several electric machines in the same electric socket.  
.....
5. A man touches uncovered wire that has an electric current. (Sharkia 2017)  
.....
6.  You insert a metallic bar in an electric socket.  
.....
7. You touch a plugged electric machine with a wet hand.  
.....
8. You try to fix or clean an electric machine, while it is switched on.  
.....
9.  The electric fires are put out by water. (Beheira 2016)  
.....



## Unit Two


10.  Touching a naked wire, while touching the ground. (Qena 2016)

11.  The spark resulting from the electric fires touches any part of your body. (Dakahlia 2016)

12. A part of your body touches an electric iron connected to electricity.

13. The electric wires are left uncovered and non insulated.

14. Electricity is not handled cautiously.

8.  Compare between the conducting materials of electricity and the non-conducting materials.

9. What is meant by ...?

1. Electric conductors.

2. Electric insulators.

3. Electric fires.

4. Electric shock.

(Kalyoubia 2017)

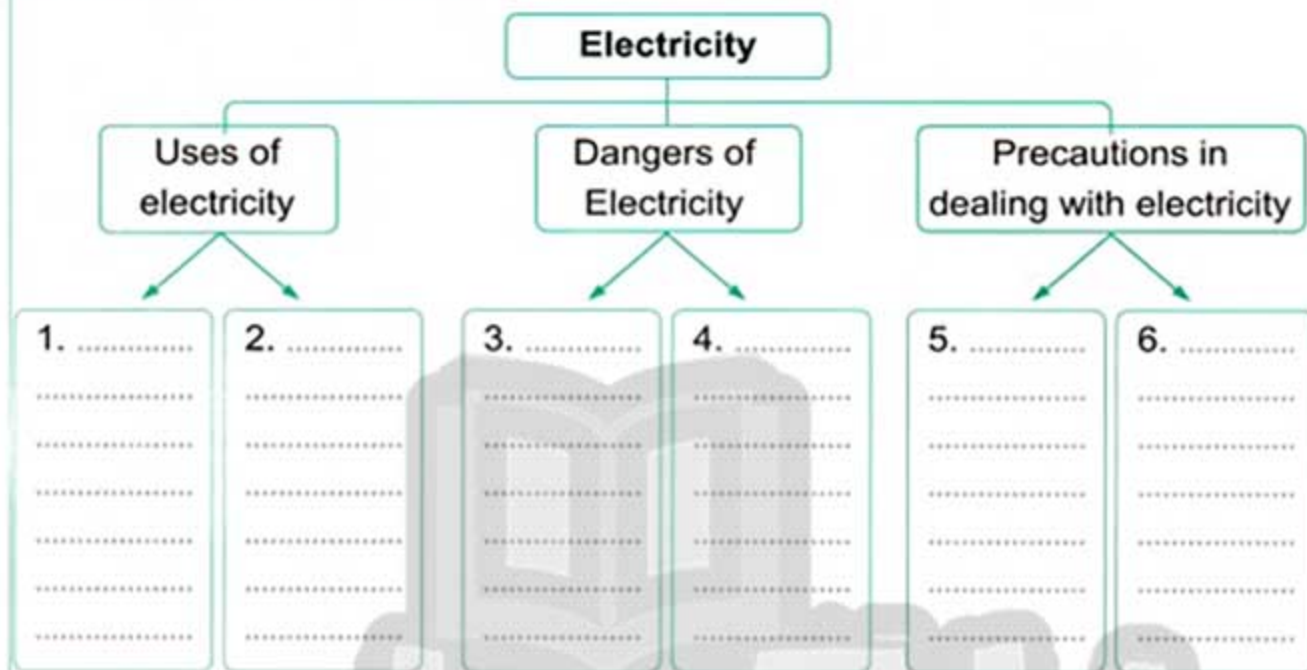
5. Electric burns.

10. Mention some of the important precautions when dealing with electricity.

(Cairo 2015)



11. Complete the following diagram :



12. State the reasons for the fires resulting from the electricity.

.....  
 .....  
 .....

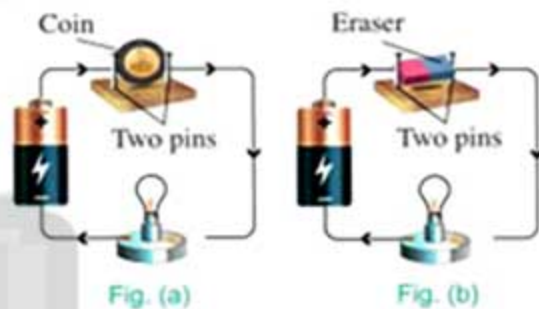


# Timss Questions



## 1. Look at the opposite figures, then answer :

- A. Which circuit becomes open when the wire is connected to the light bulb? Why ?



- B. Which circuit becomes closed when the wire is connected to the light bulb? Why ?

## 2. Circle the mistakes in the following article and correct them.

- Human body is a good conductor of electricity, because 50% of the body contains water vapour, so the electric burn happens when your body is a part of open electric circuit. In many cases electric shock causes vomiting.

3. Person (A) is subjected to an electric shock with 30 Ampere (Ampere is the unit of strength of the electric current) in 10 seconds , while person (B) is subjected to another electric shock with 60 Ampere in 15 seconds.

Which person may die ?

4. a. Call the physician immediately  
b. Open up the tight clothes of the injured  
c. Start artificial respiration immediately if the injured cannot breath.

Put one suitable title for all the previous sentences.



# UNIT 3

## The Universe

### Lessons of the unit :

1. The solar eclipse.
2. The lunar eclipse.



### UNIT OBJECTIVES

By the end of this unit, you will be able to :

- Identify the phenomenon of the solar eclipse.
- Do activities to explain types of solar eclipse.
- Identify safety precautions on observing solar eclipse.
- Identify the phenomenon of the lunar eclipse.
- Do activities to explain types of lunar eclipse.
- Compare solar eclipse with lunar eclipse.



## 1

## LESSON

## The solar eclipse

◎ All of us know that :

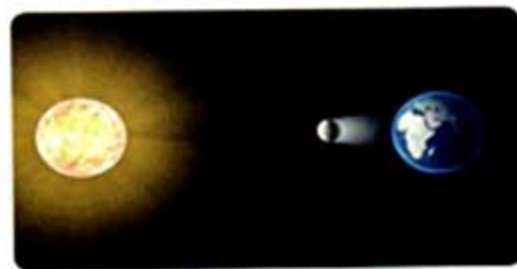
- Sun emits heat and light.
- Light travels in straight lines.

**But**, when a dark object gets in the way of sunlight, it blocks a part of sunlight forming a shadow for this object, where the temperature in shadow area is moderate.

**So**, the shadow is formed when a dark object gets in the way of light and blocks a part of it.

## Examples :

1. The formation of a shadow of a tree in a sunny morning when it gets in the way of sunlight.
2. The formation of a shadow of a celestial body like our Moon on Earth when it lies on one straight line between the Sun and the Earth and blocks sunlight from Earth.



**This phenomenon is called "Solar eclipse".**

blocks                      يخفى (يحجب)                      solar eclipse  
celestial body                      جسم كوني (فضائي)                      shadow

ظاهرة                      كسوف الشمس                      phenomenon  
ظل                      ظل

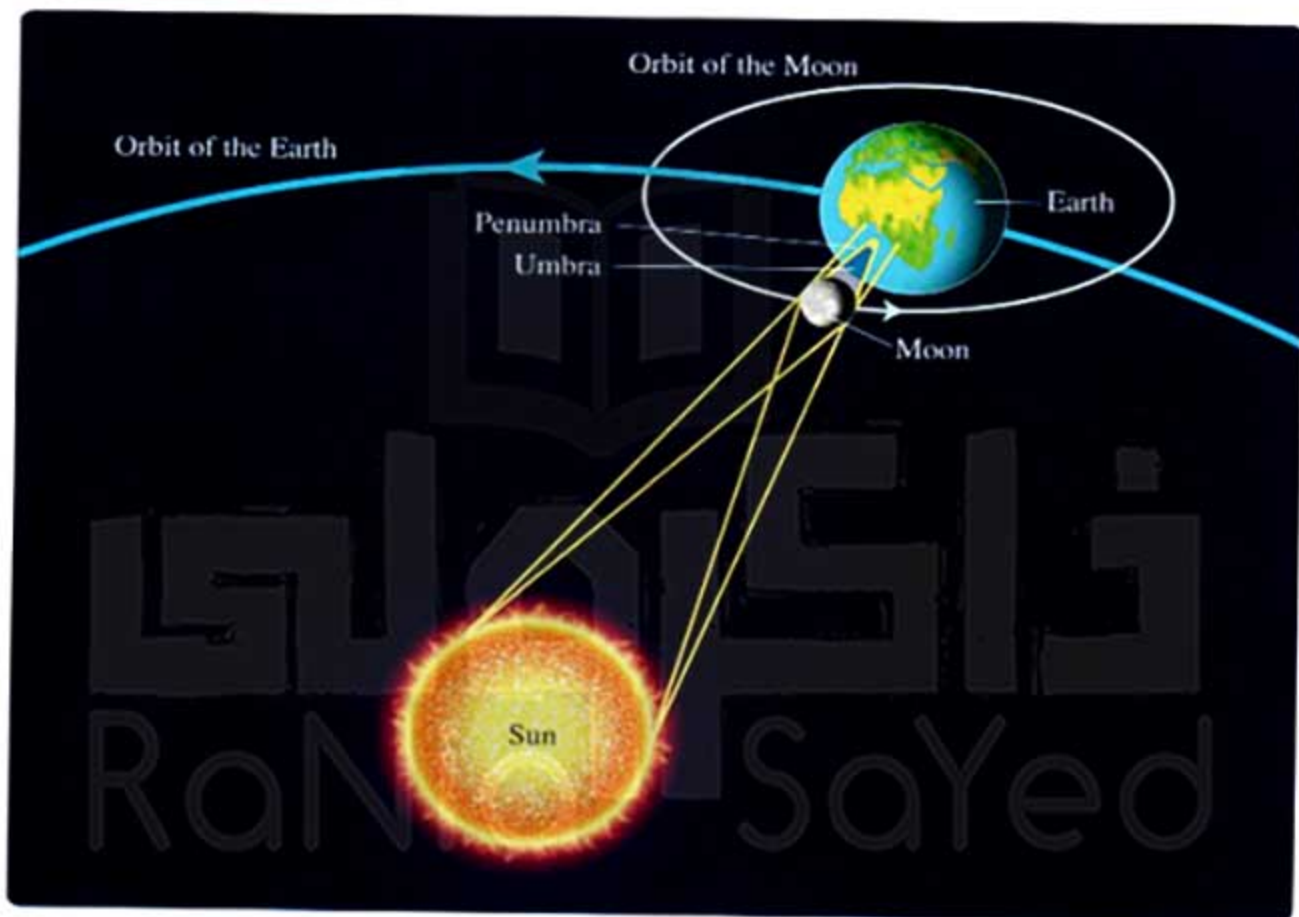


## The solar eclipse phenomenon



## The solar eclipse :

It is the astronomical phenomenon which occurs when the **Earth** , the **Moon** and the **Sun** are nearly on one straight line with the **Moon** in the middle.



- It is seen in the **morning** only.
- The Earth revolves around the Sun in an oval orbit.
- At the same time, the Moon revolves around the Earth in a smaller oval orbit.
- Sometimes during the rotation of the Earth and the Moon, the Moon comes between the Sun and the Earth in one straight line casting its shadow on the Earth and preventing sunlight from reaching the Earth, this is the **solar eclipse**.

astronomical phenomenon

ظاهرة فلكية casting

سُلب

oval orbit

مدار بيضاوي



## Activity 1

To explain how the solar eclipse is formed.

## Step (1) :

- Put a tennis ball (represents the Moon) between a big light source (represents the Sun) and a screen (represents the Earth) as shown in the following figure.

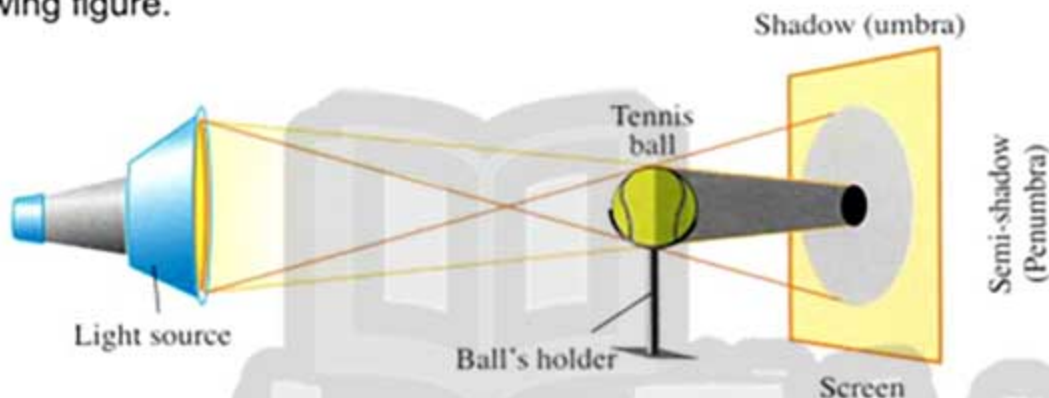


Fig. (1)

## Observation:

- The formation of a real shadow area (cone shadow) called "**umbra**" in which you **can't** see the light source at all.
- The formation of a semi-shadow area (between the lighted area and the real shadow area) called "**Penumbra**", in which you will **see part** of the light source only.

## Step (2) :

- Move the tennis ball **farther** from the screen as shown in the following figure.

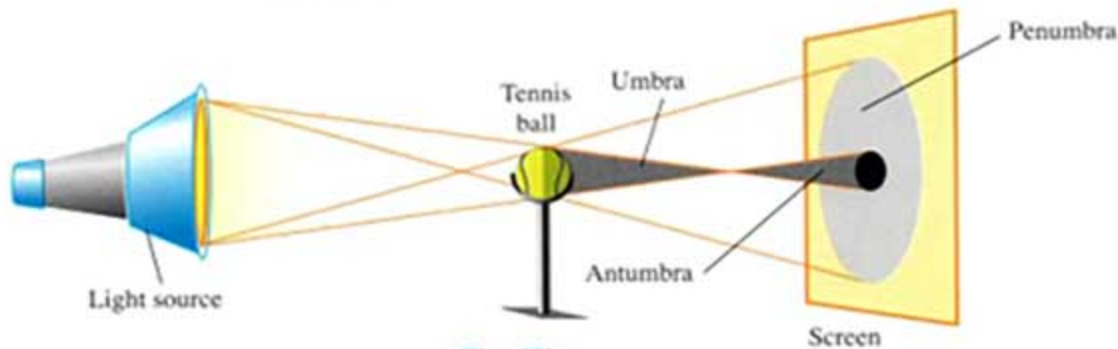


Fig. (2)

cone shadow ظل مخروطي umbra

ظل penumbra

antumbra شبه الظل

الظل السلي



## Observation:

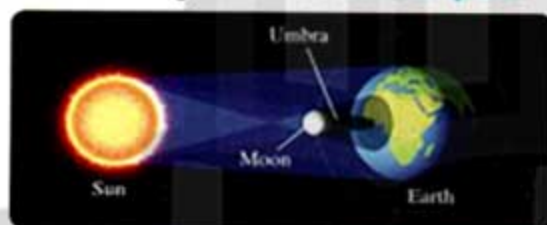
- Umbra doesn't reach the screen, but it casts a negative shadow (**antumbra**) in which you can see the light source as a lighted ring.
- The formation of a semi-shadow area.

By applying the previous activity in space, you will observe that :

When the Moon comes between Earth and the Sun, but nearer to Earth during its rotation in its oval orbit, it appears equal in size to the Sun.

So,

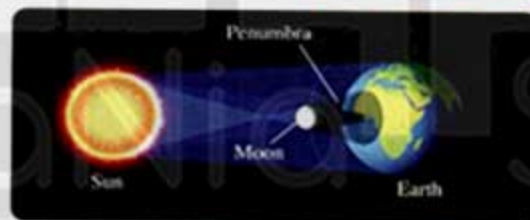
1. It blocks sunlight **totally** from the area of Earth that lies in **umbra** area of the Moon forming **total solar eclipse**.



Total solar eclipse



2. It blocks sunlight **partially** from the area of Earth that lies in **penumbra** area of the Moon forming **partial solar eclipse**.



Partial solar eclipse



When the Moon comes between Earth and the Sun, but farther from Earth (in a higher orbit from Earth), it appears smaller than the Sun.

So,

1. It causes **an annular solar eclipse** to the area of Earth that lies in **antumbra** area of the Moon.
2. It causes **partial solar eclipse** to the area of Earth that lies in **penumbra** area of the Moon.



Annular solar eclipse

totally

كُتِبَ partially

جُزئياً annular

حلقى



**Cone umbra (umbra) :**

It is the dark inner shadow area in which the total solar eclipse appears.

**Penumbra :**

It is the faint outer shadow area in which the partial solar eclipse appears.

**Conclusion:**

- The solar eclipse phenomenon occurs when the Moon passes between the Sun and Earth casting its shadow on the Earth's surface.
- The type of solar eclipse changes according to the distance between the Moon and Earth during its rotation in its oval orbit around Earth.

**Types of solar eclipse****Total solar eclipse**

It is a type of solar eclipse in which we can't see the Sun completely and it is formed in the shadow area (umbra) of the Moon.

**Partial solar eclipse**

It is a type of solar eclipse in which we can see part of the Sun and it is formed in the semi-shadow area (penumbra) of the Moon.

**Annular solar eclipse**

It is a type of solar eclipse in which the Sun appears as a lighted ring and it is formed when the Moon is in a higher orbit from the Earth.



**The type of solar eclipse differs according to the movement of the Moon in front of the Sun.**

Due to the part of the Sun that the Moon hides during its passage in front of the Sun.

hide قرص الشمس Sun's disk يغطي / يندوم last بالكامل completely باهت faint



## NOTE

The solar eclipse phenomenon doesn't last more than **seven minutes and forty seconds**.

## Safety precautions on observing the solar eclipse :

1. We must not look directly at the Sun in ordinary days. **G.R.**

Because it emits harmful rays as ultraviolet (UV) and infrared rays that affect the eye retina and may cause blindness within few minutes.

2. Doctors advise us to use special glasses to observe the solar eclipse. **G.R.**

Because the outer solar corona emits ultraviolet (UV) and infrared rays.



## Do you know ?

Ancient people from the Babylon age managed to identify the times of occurrence of the solar eclipse and lunar eclipse phenomena tentatively before its occurrence by 2 years.

## Try to answer

Worksheet 7  
in the Notebook.

safety  
corona  
precautions

أمان ultraviolet  
هالة blindness  
إحتياطات infrared

فوق البنفسجية retina  
العمى tentatively  
تحت الحمراء Babylon age

شبكة العين  
تقريباً  
العصر البابلي



# Remember



## ⊙ Solar eclipse :

It is an astronomical phenomenon which occurs when **Earth**, the **Moon** and the **Sun** are on one straight line with **the Moon in the middle**.

## ⊙ Cone umbra (umbra) region :

It is the dark inner shadow area in which the total solar eclipse appears.

## ⊙ Penumbra region :

It is the faint outer shadow area in which the partial solar eclipse appears.

## ⊙ There are three types of solar eclipse which are :

- Total solar eclipse.
- Partial solar eclipse.
- Annular solar eclipse.

## ⊙ Comparison between total, partial and annular solar eclipse.


Points of comparison	Total solar eclipse	Partial solar eclipse	Annular solar eclipse
Shape of Sun :	We can't see the Sun completely.	We can see part of the Sun.	Sun appears as a lighted ring.
Position of Moon :	Nearer to Earth.	Nearer to or farther from Earth.	Farther (in a higher orbit) from Earth.
Shadow area that casts on Earth :	Umbra.	Penumbra.	Antumbra.

- ⊙ Doctors advise to use **special glasses** to observe the solar eclipse, because the outer solar corona emits ultraviolet and infrared rays.



# Questions on lesson one



Questions signed by  have been taken from the school book.

## 1. Choose the correct answer :

- Sunlight travels in ..... lines, so it casts a shadow of the dark bodies in its way.  
a. curved      b. zigzag      c. straight      d. dashed
- In the shadow area of a tree, you feel .....  
a. more hot.      b. moderate hot.      c. more cold.      d. no correct answer.
- When the Moon lies between the Sun and the Earth, it casts its shadow on .....  
a. the Earth.      b. the Sun.      c. itself.      d. no correct answer.
- The solar eclipse occurs when the Earth, the Moon and the Sun are nearly on one straight line with ..... (Giza 2017)  
a. Earth is between the Moon and the Sun.  
b. the Moon is between Earth and the Sun.  
c. Sun is perpendicular on both Earth and the Moon.  
d. (a) , (b) and (c).
- ..... is the phenomenon of blocking the sunlight by the Moon from reaching the Earth's surface.  
a. Cloudy weather      b. Winter  
c. Lunar eclipse      d. Solar eclipse
- The solar eclipse always occurs .....  
a. at night.      b. in the morning.  
c. day and night.      d. all day.
- Umbra is the .....  
a. dark shadow area.      b. semi-shadow area.  
c. lightened area.      d. sunny area.
- Penumbra is the .....  
a. dark shadow area.      b. semi-shadow area.  
c. lightened area.      d. sunny area.
- The orbit of the Moon around the Earth is .....  
a. oval.      b. circular.      c. spherical.      d. rectangular.
- When the Moon lies in one straight line between the Sun and Earth at a nearer distance to Earth, ..... happens.  
a. total solar eclipse      b. lunar eclipse  
c. annular solar eclipse      d. partial lunar eclipse



## Unit Three

11. When the Moon lies in a higher orbit than the Earth in front of the Sun, ..... happens. (Beheira 2017)
- a. total solar eclipse                      b. partial solar eclipse  
c. annular solar eclipse                      d. lunar eclipse
12. The partial solar eclipse appears in the area of .....
- a. umbra.                      b. penumbra.                      c. antumbra.                      d. no correct answer.
13. The total solar eclipse occurs in the area of .....
- a. umbra.                      b. penumbra.                      c. antumbra.                      d. no correct answer.
14. In the annular solar eclipse, the Moon size appears ..... the size of the Sun.
- a. larger than                      b. smaller than                      c. equal to                      d. more tiny than
15. The type of eclipse differs according to the movement of ..... in front of the Sun.
- a. Earth                      b. Moon                      c. Mercury                      d. Saturn
16. When the Moon prevents part of sunlight from reaching Earth, ..... is produced.
- a. total solar eclipse                      b. lunar eclipse  
c. partial solar eclipse                      d. annular solar eclipse
17. In the semi-shaded area of the Moon, we can see a part of the Sun forming what is known as the .....
- a. total solar eclipse.                      b. partial solar eclipse.  
c. lunar eclipse.                      d. annular solar eclipse.
18. .... is the dark inner shadow area in which the total solar eclipse appears.
- a. Umbra                      b. Penumbra  
c. Antumbra                      d. No correct answer
19. .... is the faint outer shadow area in which the partial solar eclipse appears.
- a. Umbra                      b. Penumbra                      c. Antumbra                      d. No correct answer
20. The duration of the solar eclipse doesn't exceed ..... (El-Menofia 2017)
- a. three minutes and few seconds.                      b. seven minutes and few seconds.  
c. two hours and few minutes.                      d. two days and few hours.
21. The ..... of the eye is affected by the harmful rays of the Sun during the solar eclipse.
- a. retina                      b. eye pupil                      c. cornea                      d. no correct answer



22. .... rays are harmful to eye and may cause blindness in few minutes.  
 a. Infrared      b. Ultraviolet      c. Visible light      d. (a) and (b)
23. To observe the solar eclipse safely, you should wear .....  
 a. special glasses.      b. heavy clothes.  
 c. medical glasses.      d. lenses.

**2. Put (✓) in front of the right statement and (×) in front of the wrong one, then correct it :**

- When the Earth lies between the Sun and the Moon, the solar eclipse occurs. ( )
- The Moon revolves around the Earth in an oval shape orbit. ( )
- The solar eclipse occurs when the Moon casting its shadow on part of the Earth's surface. ( )
- The distance between the Moon and the Earth doesn't change during the Moon's rotation. ( )
- The cone shadow of the Moon is called umbra. ( )
- The type of the solar eclipse differs according to the Moon movement in front of the Sun. ( )
- The total solar eclipse occurs in the penumbra region. (Cairo 2015) ( )
- In the annular solar eclipse, the Sun disappears completely. ( )
- We can see the Sun completely in partial solar eclipse. ( )
- More than one type of solar eclipse can be observed. ( )
- The duration of solar eclipse doesn't exceed seven minutes and few seconds. (Cairo & Giza 2017) ( )
- Partial solar eclipse occurs when the Earth is in the semi-shaded area of the Moon. (Cairo 2016) ( )
- The annular solar eclipse occurs when the Moon is in higher orbit than the Earth. (El-Beheira 2016) ( )
- Total solar eclipse is formed when the Moon is between Sun and Earth in a higher orbit from the Earth. ( )
- Partial solar eclipse occurs when the cone umbra doesn't reach the Earth's surface. (Assiut 2017) ( )
- The penumbra is the dark inner shadow area of the Moon. ( )
- In the antumbra region, the annular solar eclipse appears. ( )



## Unit Three

18. The solar eclipse phenomenon occurs continuously. ( )  
 19. It is safe to observe the solar eclipse with naked eyes directly. ( )  
 20. When you look at solar eclipse without using glasses, your eyes can be harmed by ultraviolet and infrared rays. (Aswan 2017) ( )



## 3. Write the scientific term of each of the following :

- The astronomical phenomenon in which the sunlight is blocked from reaching the Earth by the Moon. (.....)
- It occurs when the Moon comes between the Earth and the Sun on one straight line. (.....)
- The Moon's dark inner shadow area. (.....)
- The area in which the total solar eclipse appears. (.....)
- The faint outer shadow area of Moon. (.....)
- The area in which the partial solar eclipse appears. (.....)
- An area that appears between the lighted area and the real shadow area and we can see a part of the light source if we stand in this area. (Port Said 2017) (.....)
- The solar eclipse in which the Sun disappears completely. (.....)
- Hiding the sunlight totally in the day. (.....)
- The solar eclipse in which part of the Sun disappears. (.....)
- A phenomenon formed when the Moon comes in an orbit higher from the Earth. (Giza 2017) (.....)
- A phenomenon that its duration doesn't exceed seven minutes and few seconds. (.....)
- It occurs when the Earth is in the semi-shaded area of the Moon and in this case we can see part of the Sun. (.....)
- The solar eclipse in which the Sun appears as a lighted ring. (.....)
- The harmful rays emitted from the Sun during the solar eclipse. (.....)

## 4. Complete the following statements :

- The ..... is formed when a dark object blocks part of the incoming light.
- ..... is the phenomenon that happens when the Moon comes between the Sun and Earth during its rotation. (Fayoum 2015)
- Solar eclipse occurs when the ..... lies between the ..... and the Sun on one straight line. (Cairo & Dakahlia 2016)
- The solar eclipse is formed when the ..... casting its ..... on part of Earth.







5. The ..... rotates around the Earth in ..... shape orbit.
6. In the ..... area of the shadow, the light source can't be seen completely.
7. In total solar eclipse, the Moon appears in ..... size to that of the Sun.
8. .... is the Moon's dark shadow area in which the total solar eclipse appears.
9. .... is the Moon's faint shadow area in which the partial solar eclipse appears.
10. .... is the type of solar eclipse in which the Sun disappears completely.
11. In ..... solar eclipse, the Sun appears as a lighted ring.
12. The solar eclipse phenomenon doesn't last for more than ..... minutes and ..... seconds.
13. Types of solar eclipse are ..... and annular solar eclipse.
14.  A ..... solar eclipse is formed when the Moon is located in an orbit higher than that of the Earth. (Port Said 2017)
15. The type of solar eclipse differs according to the ..... in front of the Sun. (Beheira 2016)
16.  The ..... phenomenon occurs continuously when the ..... hides the sunlight from part of the Earth during its passage in front of it.
17. When the Earth lies in the semi-shaded area of the Moon, we can see ..... of the Sun and this is known as .....
18. During the solar eclipse, the outer solar corona emits harmful rays such as ..... and .....
19. Doctors advice to use ..... to observe the solar eclipse.
20. Focus looking at the Sun during the solar eclipse may cause ..... in few minutes.

### 5. Give reasons for the following :

1. Occurrence of the solar eclipse phenomenon. (Cairo 2017)
2. The Moon blocks sunlight from reaching the Earth when it comes between the Sun and the Earth.
3. The distance between the Moon and the Earth varies during the Moon's rotation around the Earth.



## Unit Three

4.  The type of solar eclipse differs according to the movement of the Moon in front of the Sun.  
.....
5. The total solar eclipse is formed when the Moon rotates nearer to the Earth.  
.....
6.  The annular solar eclipse occurs when the Moon comes in an orbit higher than Earth.  
.....
7. The total solar eclipse appears at umbra.  
.....
8. The partial solar eclipse appears at penumbra.  
.....
9. We see the Sun as a lighting ring when annular solar eclipse is formed.  
.....  
(Fayoum 2016)
10.  We shouldn't look directly at the Sun with naked eye during the solar eclipse.  
.....  
• Doctors warn from the direct observation of the Sun during solar eclipse.  
.....  
(Assuit 2017)
11. Special glasses must be used to look at the solar eclipse.  
.....  
(Giza 2017)
12. Although the weak glowing of the Sun during the eclipse, we musn't look at it.  
.....
13.  We can't see the Sun completely during the total solar eclipse. (Gharbia 2017)  
.....

## 6. What happens when ... ?

1. An object is put between a light source and a screen.  
.....



2. The Earth, the Moon and the Sun are nearly on one straight line with the Moon is in the middle. (Sharkia 2017)
3. The solar eclipse is watched from the umbra region.
4. The solar eclipse is watched from the penumbra region.
5. The solar eclipse is watched from the antumbra region.
6. The Moon lies in a higher orbit from the Earth. (Gharbia 2017)
7. The size of Moon appears smaller than the Sun during the solar eclipse.
8. The Moon hides part of the Sun from the Earth's surface.
9. The Moon cone shadow does not reach the Earth. (El-Menofia 2017)
10. Someone looks at the Sun directly with naked eyes for a long time to observe solar eclipse. (Gharbia & Ismailia 2017)
11. You use special glasses during observing the solar eclipse.

### 7. What is meant by ... ?

1. The solar eclipse.
2. Cone shadow (umbra).
3. The penumbra.
4. Total solar eclipse.
5. Partial solar eclipse. (Cairo 2017)



## Unit Three

6. Annular solar eclipse.

(Ismailia 2015)

8. Compare between :

1. Total solar eclipse and annular solar eclipse.

2. Total solar eclipse and partial solar eclipse.

(Port Said 2016)

9. Notice the two cases of solar eclipse in the following figures, then answer :



Fig. (1)



Fig. (2)

1. Identify each type.

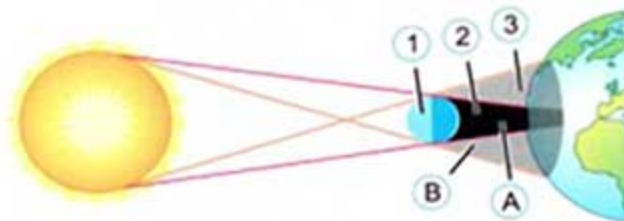
2. Explain the reasons of their occurrence.

10. Examine the opposite figure, then answer :

(Luxor 2015)

1. Label the figure.

- 1 .....  
2 .....  
3 .....



2. Mention the type of solar eclipse that occurs at areas :

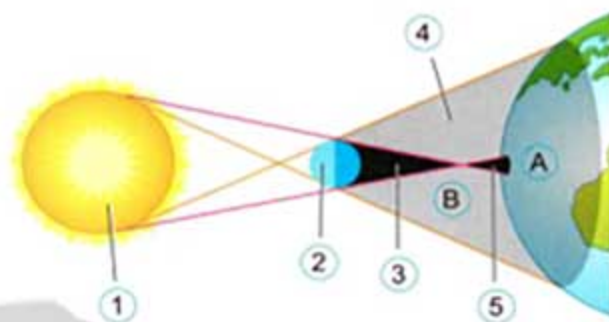
- A .....  
B .....



## 11. Examine the opposite figure, then answer :

1. Label the figure.

- ① .....  
 ② .....  
 ③ .....  
 ④ .....  
 ⑤ .....



2. Mention the type of solar eclipse occurs at areas :

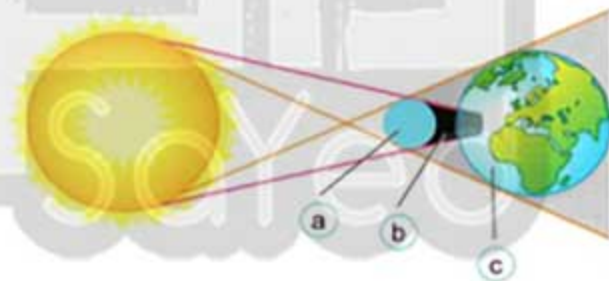
- A .....  
 B .....

## 12. Identify the astronomical phenomenon shown in the following figure, then label it :

(El-Menofia &amp; Ismailia 2016)

1. This phenomenon is .....

2. a .....  
 b .....  
 c .....





# Timss Questions



## 1. Circle the mistakes in the following paragraph and correct them.

- There are 2 types of solar eclipse which are total solar eclipse that is formed in penumbra of Moon and we can see the Sun completely. Second type is partial solar eclipse that is formed in shadow area of Moon and we can see the Sun completely.

## 2. Ahmed observes a total solar eclipse and write his note about this phenomena he said that it lasts for more than 15 minutes.

Do you agree with Ahmed ?

Yes

No

Explain your answer.

## 3. Different rays emitted from the Sun play important role in the bad effect of solar eclipse.

Mention this harm.

## 4. The correct arrangement of the celestial bodies during the solar eclipse is :

- |                      |                      |
|----------------------|----------------------|
| a. Sun, Earth, Moon. | b. Sun, Moon, Earth. |
| c. Moon, Sun, Earth. | d. Moon, Earth, Sun. |

## 5. These people are wearing a special type of glasses to observe an astronomical phenomenon.

a. What is the name of this phenomenon ?

b. Mention the reason for using these glasses to observe this phenomenon.





6. Look at the following figures that show the types of the solar eclipse, then answer :

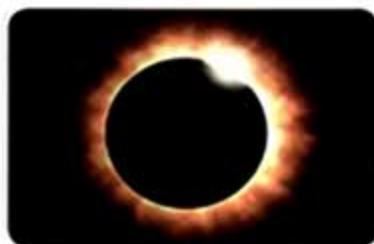


Fig. (a)



Fig. (b)



Fig. (c)

1. In which figure we can't see the Sun completely ? (.....)
2. In which figure, does the Earth locate in the umbra area of the Moon ? (.....)
3. In which figure, does the Earth locate in the antumbra area of the Moon ? (.....)
4. In which figure, does the Earth locate in the penumbra area of the Moon ? (.....)

**الآن**



استمتع بمشاهدة شرح الدروس والتجارب والأنشطة التفاعلية على هاتفك الذكي أو جهازك اللوحي عن طريق تحميل تطبيق :

"EL-Moasser science 6<sup>th</sup> prim. T2"



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## 2

## LESSON

## The lunar eclipse

Write the name of the phenomenon that each figure represents :

1



Answer : Solar eclipse

2



Answer : Lunar eclipse

## The lunar eclipse phenomenon

It is an astronomical phenomenon which occurs when the Sun, the Earth and the Moon are nearly on one straight line with the Earth in the middle hiding the sunlight from Moon.



## Question

Complete :

- In solar eclipse, ..... is between Sun and Earth.
- In lunar eclipse, ..... is between Sun and .....

lunar eclipse

الحسوف القمري hiding

يخفي

123

هذا العمل خاص بموقع ذاكرولى التعليمي ولا يسمح بتداوله على مواقع أخرى



1 It occurs twice per year.

2 It occurs in the middle of lunar month (at full moon phase) when Earth hides all sunlight or part of it from Moon.

### More information about lunar eclipse

5 It doesn't require precautions or special devices to observe it, because it doesn't harm eyes when looking at it.

3 It is seen at night from any place on Earth when the Sun is behind the horizon.

4 It lasts for an hour or two hours (or more than two hours).

G.R.

The lunar eclipse occurs in the middle of the lunar month (full moon).

Because in the middle of the lunar month, the Earth lies between the Sun and the Moon.

#### NOTE

The only time in which lunar eclipse occurred three times was in 1982.



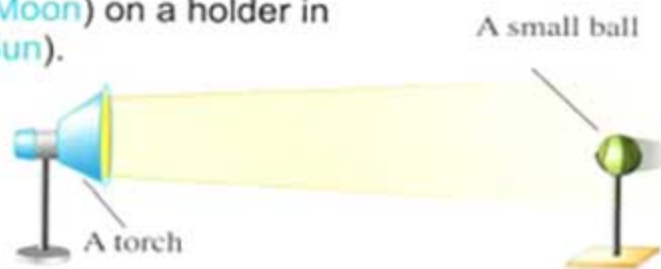
#### Activity

To show how the lunar eclipse occurs.



#### Steps:

1. Put a small ball (represents the Moon) on a holder in front of a torch (represents the Sun).
2. Focus the light of the torch on the small ball so that they are on one straight line.



#### Observation:

- The small ball (the Moon) appears lighting.

information  
phase

معلومات twice  
وجه / طور behind

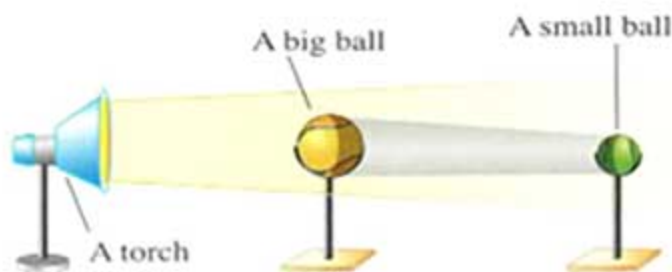
مرتين full moon  
خلف horizon

اليد  
أفق



## Unit Three

3. Put a big ball (represents the Earth) on another holder and move it between the torch and the small ball as shown in the following figure.

**Observation:**

The part of the small ball (the Moon) that faces the big ball (the Earth) is completely dark.

**Conclusion:**

When the Earth comes between the Sun and the Moon and they are on one straight line, it hides the sunlight from the Moon forming lunar eclipse.

**Types of lunar eclipse**

## 1. Total lunar eclipse.

## 2. Partial lunar eclipse.

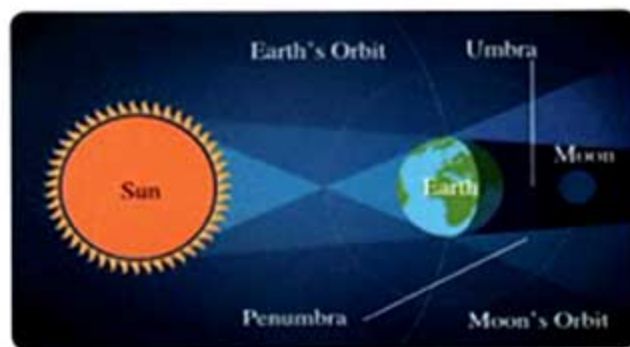
**1 Total lunar eclipse****Total lunar eclipse**

It is the lunar eclipse which occurs when the whole Moon enters the shadow area (umbra) of the Earth.

During the start of total lunar eclipse, the colour of the Moon tends to be red.

**The reason :**

Because Earth's atmosphere doesn't absorb infrared rays coming from the Sun and refracts them on Moon.



Total lunar eclipse



total lunar eclipse  
partial lunar eclipse

خسوف كلي whole Moon  
خسوف جزئي

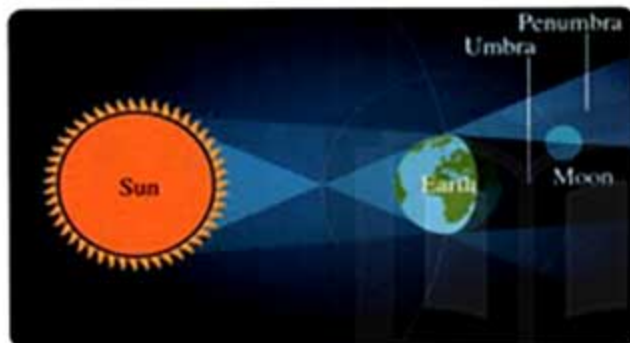
القمرة كاملاً



## Partial lunar eclipse

## Partial lunar eclipse

It is the lunar eclipse which occurs when a **part** of the Moon enters the shadow area (umbra) of the Earth.



Partial lunar eclipse

## NOTES

1. When the whole Moon enters the semi-shaded area (penumbra) of the Earth, the Moon light turns to be faint without being eclipsed and this phenomenon is known as **lunar non-eclipse**.



Lunar non-eclipse

2. There is no annular lunar eclipse, because the Earth has a great size relative to that of the Moon, so it always blocks all sunlight when it comes between the Sun and the Moon.

relative to

بالنسبة إلى faint

باعت



## Unit Three

## Exercise

Observe the following figure which represents the lunar eclipse phases occurred on 21<sup>st</sup> February 2008.



It started at three o'clock and it ended at three o'clock and fifty one minutes.

1. Calculate the time taken for this lunar eclipse.
2. Describe and determine the types of lunar eclipse illustrated in this figure.

## Answer

- 1 The time taken is fifty one minutes.
- 2 The Moon light turns to be faint without being eclipsed which is known as **lunar non-eclipse**.  
(the whole moon lies in penumbra region of Earth).

- It changes into **partial lunar eclipse**  
(part of Moon enters the umbra region).

- It changes into **total lunar eclipse**  
(the whole Moon enters the umbra region).

- It changes into **partial lunar eclipse** again  
and finally changed to **lunar non-eclipse**.



## Try to answer

- Worksheet 8
- General exercise of the school book on Unit 3
- Model exams on Unit 3 in the Notebook.



# Remember




## Comparison between solar eclipse and lunar eclipse :

Points of comparison	Solar eclipse	Lunar eclipse
1. Figure :		
2. Reason :	It occurs when the Moon comes between Earth and Sun on one straight line.	It occurs when Earth comes between Moon and Sun on one straight line.
3. Time of occurrence :	It is seen at morning only.	It is seen at night only.
4. Duration :	Its duration doesn't exceed seven minutes and few seconds.	Its duration may last for more than two hours.
5. Harm :	It causes serious harms to eyes.	It doesn't cause any harm to eyes.
6. Safety precautions :	It requires precautions and special glasses to observe it.	It doesn't require precautions or special devices to observe it.
7. Types :	<ul style="list-style-type: none"> <li>- Total solar eclipse.</li> <li>- Partial solar eclipse.</li> <li>- Annular eclipse.</li> </ul>	<ul style="list-style-type: none"> <li>- Total lunar eclipse.</li> <li>- Partial lunar eclipse.</li> </ul>



# Questions on lesson two



Questions signed by  have been taken from the school book.

## 1. Choose the correct answer :

- The lunar eclipse is formed when the Earth comes between the Sun and .....  
 a. Earth.      b. Moon.      c. Jupiter.      d. Mercury.
- Lunar eclipse occurs when Earth is on one straight line with the Moon , the Sun and .....  
 a. Earth is between the Moon and the Sun.  
 b. Moon is between Earth and the Sun.  
 c. the Sun is between Earth and the Moon.  
 d. a star is between the Sun and the Moon.
- The dark shadow area of the Earth is called .....  
 a. antumbra.      b. penumbra.      c. umbra.      d. negative shadow.
- The lunar eclipse occurs ..... (Cairo & Kalyoubia 2017)  
 a. in the middle of lunar month (two times per year).  
 b. at the end of lunar month.  
 c. at the beginning of lunar month.  
 d. on the first 3 days of lunar month.
- The lunar eclipse occurs ..... time(s) per year.  
 a. 1      b. 12      c. 5      d. 2
- We can observe the lunar eclipse when the Moon phase is .....  
 a. crescent.      b. 1<sup>st</sup> quadrature.      c. full moon.      d. new moon.
- During the start of the total lunar eclipse, the colour of the Moon tends to be .....  
 a. gray.      b. yellow.      c. orange.      d. red.
- ..... occurs to the Moon.  
 a. Partial lunar eclipse      b. Total lunar eclipse  
 c. Annular solar eclipse      d. (a) and (b)
- When the whole Moon enters the shadow area (umbra) of Earth, ..... occurs.  
 a. partial lunar eclipse      b. total lunar eclipse  
 c. total solar eclipse      d. partial solar eclipse



10. When the whole Moon enters the semi-shaded area of the Earth, ..... occurs. (Beheira 2015)
- a. total solar eclipse                      b. partial lunar eclipse  
c. lunar non-eclipse                      d. annular solar eclipse
11. The partial lunar eclipse occurs when part of the Moon enters the Earth's .....
- a. umbra.                      b. penumbra.                      c. antumbra.                      d. atmosphere.
12. Among the similarities between solar eclipse and lunar eclipse is that each of them .....
- a. can be seen at night.                      b. causes harms for eye.  
c. is repeated at regular periods.                      d. lasts for 2 hours.
13. When the Moon looks slightly faint, it indicates .....
- a. total lunar eclipse.                      b. partial lunar eclipse.  
c. partial solar eclipse.                      d. no eclipse.
14. When the Earth prevents all sunlight from reaching the Moon, it forms .....
- a. total lunar eclipse.                      b. partial lunar eclipse.  
c. total solar eclipse.                      d. no eclipse.
15. When the whole Moon enters the semi-shaded area of Earth, the Moon light turns to be faint .....
- a. and solar eclipse occurs.                      b. and lunar eclipse occurs.  
c. without being eclipsed.                      d. all the previous answers.
16. The duration of lunar eclipse is ..... that of the solar eclipse.
- a. longer than                      b. shorter than                      c. equal to                      d. twice (Sharkia 2017)

**2. Put (✓) in front of the right statement and (x) in front of the wrong one, then correct it :**

- The lunar eclipse occurs when the Moon lies between the Sun and the Earth on one straight line. ( )
- In the lunar eclipse, the Moon casts its shadow on the Earth's surface. ( )
- The duration of solar eclipse is longer than that of lunar eclipse. ( )
- The rate of occurrence of the lunar eclipse is two eclipses per year. ( )
- The duration of the lunar eclipse doesn't exceed seven minutes and few seconds. ( )
- The lunar eclipse requires special devices to be observed safely. ( )



## Unit Three

7. Looking directly at the lunar eclipse is harmful to the eye. ( )
8. The phenomenon of the lunar eclipse occurs in the middle of the lunar month. (Cairo 2016) ( )
9. The solar eclipse lasts for long time reaching many hours. ( )
10. The Earth forms one type of shadow when it comes in front of the Sun. ( )
11. Total lunar eclipse occurs when the whole Moon enters the shadow area of Earth. ( )
12. The Moon is coloured in red at the start of total lunar eclipse. ( )
13. The red colour of the Moon during the lunar eclipse is due to the reflection of infrared rays by the Earth's atmosphere. ( )
14. The partial lunar eclipse occurs when part of Moon enters the Earth's penumbra. ( )
15. Total lunar eclipse occurs in the Earth's penumbra. ( )
16. Although the lunar and solar eclipses attract people's attention, they don't affect the life on Earth. ( )
17. The two phenomena of lunar and solar eclipses are repeated regularly and can be predicted. (Aswan 2015) ( )
18. On the contrary of the solar eclipse, the lunar eclipse can be easily seen from the surface of the Earth by naked eye. ( )
19. In total lunar eclipse the whole Moon enters the umbra area of the Earth. ( )
20. The lunar eclipse can be seen at morning, while solar eclipse can be seen at night. ( )
21. The lunar eclipse can last for seven minutes and few seconds only. ( )
22. Since the past, man has been observing the stars and planets, he managed to develop some accurate calculations of their movement in space. ( )



## 3. Correct the underlined words :

1. Lunar eclipse occurs at the end of the lunar month. (Gharbia 2017) (.....)
2. At the beginning of total lunar eclipse, the Moon appears in yellow colour. (Fayoum 2016) (.....)
3. The solar eclipse occurs when the Earth comes between the Moon and the Sun. (.....)



4. The time of **lunar eclipse** doesn't last more than seven minutes and forty seconds. (Alex. 2016) (.....)
5. **Annular solar eclipse** occurs when the Moon enters completely in the umbra region of the Earth. (.....)
6. Total lunar eclipse doesn't occur when the whole Moon enters the **shadow** area of the Earth. (Port Said 2016) (.....)
7. **Solar eclipse** doesn't require precautions, warnings or special devices to observe it. (El-Monofia 2016) (.....)
8. The only time in which lunar eclipse occurred three times was in **1999**
9. Lunar eclipse occurs two times each **month**. (.....)
10. The lunar eclipse extends for more than two **days**. (Ismailia 2017) (.....)

#### 4. Write the scientific term of each of the following :

1. The phenomenon that occurs when the Sun, the Earth and the Moon are on one straight line with the Earth in the middle. (Cairo & Dakahlia 2017) (.....)
2. The phenomenon that occurs in the middle of lunar month at rate of two times per year. (Alex. 2016) (.....)
3. The Earth's shadow in which total lunar eclipse is formed. (.....)
4. The phenomenon that can be seen from any place on Earth when the Sun is behind the horizon at night. (Beheira 2015) (.....)
5. The Earth's shadow in which the lunar non-eclipse occurs. (.....)
6. It occurs when the Earth comes between the Moon and the Sun on one straight line. (.....)
7.  The lunar eclipse in which the whole Moon enters the shadow area of the Earth. (Sharkia & Beheira 2017) (.....)
8. Rays that cannot be absorbed by the Earth's atmosphere causing the red colour of the Moon in the start of the total lunar eclipse. (.....)
9. The phenomenon which occurs when part of the Moon enters the shadow area of the Earth. (Kafr El-Sheikh 2017) (.....)
10.  It occurs when the whole Moon enters the semi-shadow area of Earth. (.....)
11. The type of eclipse that can be seen at night only and it lasts for two hours. (.....)



## Unit Three


## 5. Complete the following statements :

1. The eclipse is formed when a celestial body comes in front of ..... and prevents its light from passing to the other side.
2. .... is the phenomenon that occurs when the Earth comes between the Sun and the Moon. (Sohag 2016)
3. Lunar eclipse occurs when the Sun, Earth and ..... are on one straight line and ..... in the middle.
4. The lunar eclipse occurs in the ..... of the lunar month when the Moon phase is .....
5. The lunar eclipse occurs at the rate of ..... per year.
6. The only time in which lunar eclipse occurred three times was in .....
7. The lunar eclipse may last for ..... or ..... hours. (Beheira 2015)
8. .... eclipse doesn't require precautions or special devices to observe it.
9. .... occurs when the ..... comes between the sun rays and a part or whole of the Moon.
10. When the Earth passes in front of the Sun, it forms two shadow areas known as ..... and .....
11. The types of lunar eclipse are ..... and .....
12. .... is the lunar eclipse in which the whole Moon enters the umbra of the Earth. (Port Said 2017)
13. In the total lunar eclipse, the Sun, the Earth and ..... are on one straight line.
14. The colour of the Moon tends to be ..... during the start of the ..... lunar eclipse.
15. The Moon appears red in colour at the beginning of total lunar eclipse because of some ..... rays, that are ..... by the Earth's atmosphere and reach the Moon.
16. .... occurs when a part of the Moon enters the Earth's umbra. (South Sinai 2015)
17. .... occurs when the whole Moon enters the Earth's penumbra.
18. The time taken by the lunar eclipse occurred in february 2008 was .....



19. Among the similarities between solar eclipse and lunar eclipse is that both of them is ..... phenomenon occurring by ..... sunlight from reaching the other body.
20. We can see ..... eclipse when the Sun is behind the horizon at night, whereas ..... eclipse always occurs in the morning.
21. The duration of ..... eclipse doesn't exceed seven minutes and few seconds, while that of ..... eclipse may last for more than two hours.
22. The ..... eclipse doesn't harm the eyes, while ..... eclipse causes serious harms to the eyes.

### 6. Give reasons for the following :

1. During the lunar eclipse, the Earth comes between the Sun and the Moon.  
.....
2. The lunar eclipse occurs in the middle of the lunar month (full moon phase).  
.....
3. The lunar eclipse doesn't require precautions or special devices to observe it.  
..... (Port Said 2017)
4. The Earth has an important role in lunar eclipse.  
.....
5. The umbra of the Earth causes two types of lunar eclipse.  
.....  
.....
6. The Moon is coloured in red at the start of the total lunar eclipse.  
.....
7.  No annular lunar eclipse is formed like the annular solar eclipse.  
.....  
..... (Sharkia 2017)
8. Lunar eclipse can be seen easily from the Earth's surface.  
.....



## Unit Three

9. The effect of the lunar eclipse on eye differs from that of the solar eclipse.

10. The phenomena of solar and lunar eclipses are considered applications of the umbra phenomenon.

11. The two phenomena of lunar and solar eclipses are repeated regularly and can be predicted.

### 7. What happens when ... ?

1. The Earth comes between the Sun and the Moon on one straight line.

2. The Earth blocks the sunlight from reaching the whole Moon.

3. The whole Moon enters the semi-shaded area of Earth. (Cairo & Dakahlia 2017)

4. The whole Moon enters the Earth's umbra. (Behira & Dakahlia 2016)

5. A part of the Moon enters the shadow area of the Earth. (Behira 2017)

6. Someone looks at the lunar eclipse with naked eye.

### 8. Define :

1. Lunar eclipse.

2. Total lunar eclipse. (Ismailia 2015)

3. Partial lunar eclipse.



9. Compare between the solar eclipse and the lunar eclipse. (Damietta 2016)

.....

.....

.....

.....

10. Draw a diagram that illustrates the lunar eclipse.

.....

.....

11. The following figure represents lunar eclipse phenomenon, observe it then answer :

(Beni-Suef 2011)

- The type of lunar eclipse is .....
- Label the figure.



- |         |         |
|---------|---------|
| 1 ..... | 2 ..... |
| 3 ..... | 4 ..... |

12. Look at the following figure, then answer :

(Gharbia 2016)



1. This figure represents the ..... phenomenon.



## Unit Three

2. Label the figure.

1 .....

2 .....

3 .....

3. This phenomenon may last for ..... or .....

4. Show the types of eclipse at :

a .....

b .....

13. Compare between total lunar eclipse and partial lunar eclipse.

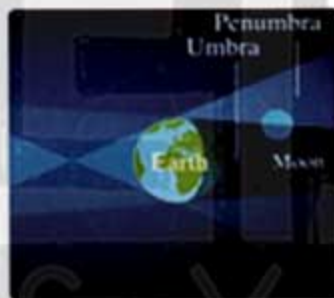
(Port Said 2015)

.....  
.....

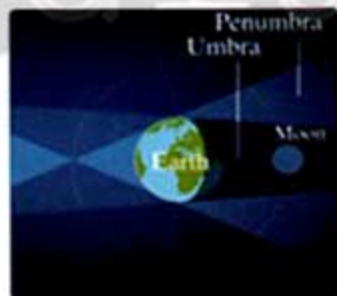
14. Mention the type of eclipse in the following figures :



1. This indicates ..... eclipse.



2. This indicates ..... eclipse.



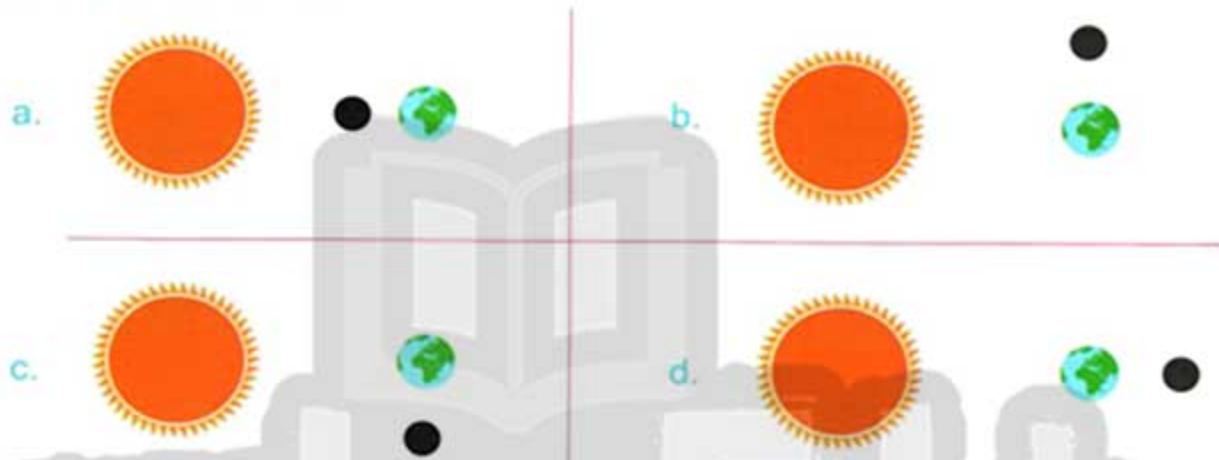
3. This indicates ..... eclipse.



# Timss Questions



1. Which diagram shows the position of the Sun , the Moon, and the Earth during an eclipse of the Moon ?



2. Mazen suffers from inflammation of retina of his eyes.  
Which reason may cause this inflammation ?
- Eating dirty food from street.
  - Observing the Moon during partial lunar eclipse.
  - Washing his eyes with mineral water.
  - Observing the Sun during solar eclipse.
3. Ahmed prepares a scientific research and he puts its title (Annular lunar eclipse) his friend Samy suggests to change its name.

Explain why ?

.....

.....



# UNIT 4

## Structure and Function of Living Organisms

### Lesson of the unit :

Absorption and transmission of water and mineral salts in plants.



### UNIT OBJECTIVES

By the end of this unit, you will be able to :

- Identify the role of root hairs in absorption of water and mineral salts from the soil.
- Identify the transmission of water and dissolved substances in plants.
- Identify the transpiration process in plants.



# The LESSON

## Absorption and transmission of water and mineral salts in plants

What is the structure of a plant ?

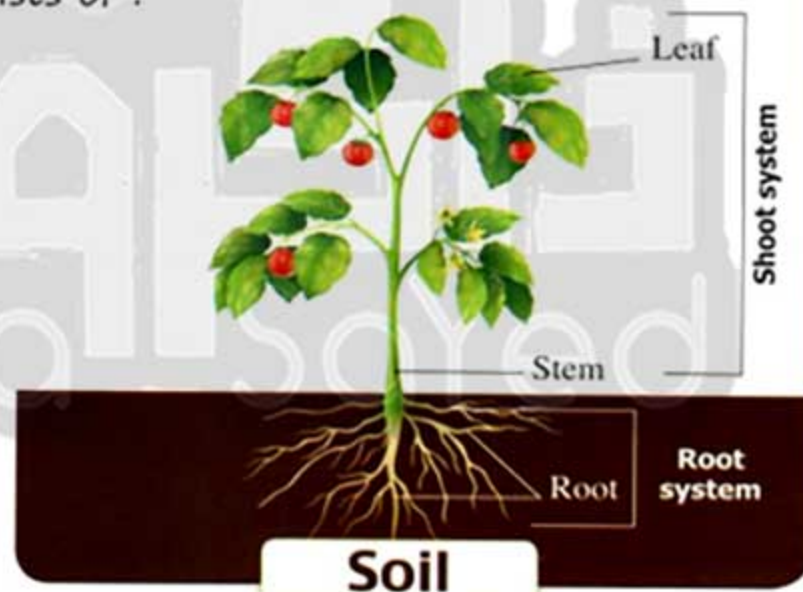
To know the answer, remove a plant from a planter or soil, then notice that it consists of :

### Shoot system

that consists of leaves and stem.

### Root system

that consists of roots.



\* Root system and shoot system participate together in making the plant food by **photosynthesis process**.

absorption	إمتصاص	transmission	إنتقال	mineral salts	أملاح معدنية
soil	تربة	root system	المجموع الجذري	shoot system	المجموع الخضرى
planter	أصيص	roots	جذور	leaves	أوراق
stem	ساق	participate	يشترك	photosynthesis process	عملية البناء الضوئى

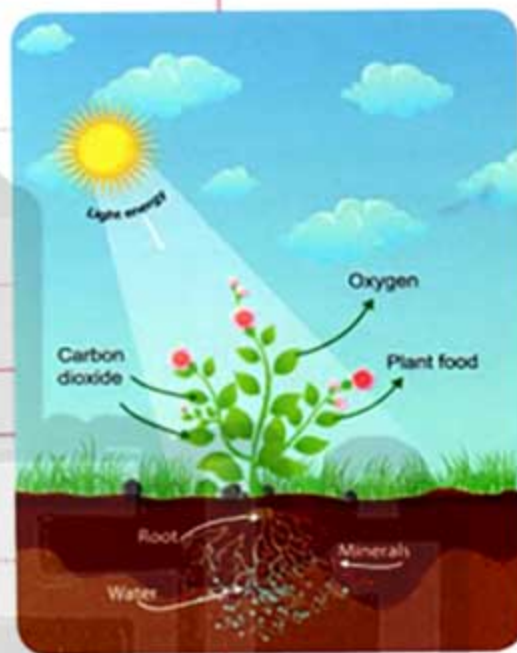


**Photosynthesis process :**

The green plants make their food from raw materials in their environment.

Photosynthesis process **occurs** when :

- 1 The plant leaves absorb carbon dioxide from air.
- 2 Root hairs in roots absorb water and mineral salts (as phosphorus, magnesium, calcium, nitrogen and zinc) from soil.
- 3 The plant leaves absorb light energy.



Photosynthesis process **produces** :

- 1 Plant food which is formed inside leaves.
- 2 Oxygen (gas) which is necessary for respiration of living organisms.

**NOTES**

- The absorption of water and mineral salts from soil occurs by **roots**.
- The transmission of water and mineral salts from roots to the other parts of plant occurs by **stem**.

**Question**

Complete the following :

1. In photosynthesis process, the plant needs ..... , ..... and .....
2. The plant produces ..... and ..... during photosynthesis process.

raw materials

مواد خام root hairs

شعيرات جذرية



## THE LESSON

## First

## Absorption of water and mineral salts

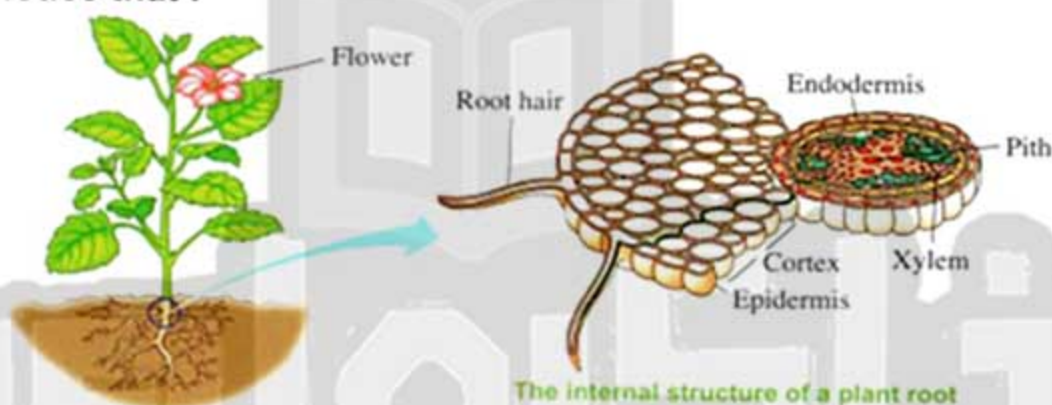
- It occurs through **root hairs** in the **epidermis layer** of the root system.
- Now, we will study : \* **Root system.** \* **Root hairs.**

## 1

## The root system :

## Its structure :

By examining the ready made slide of a cross-section of a plant root, we notice that :



The root is composed of a number of layers which are :

## 1 Epidermis layer :

It is the external thin layer that has root hairs extended from its cells.



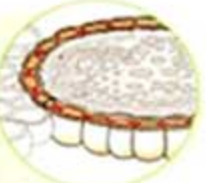
## 2 Cortex layer :

It is a thick layer that follows the epidermis layer.



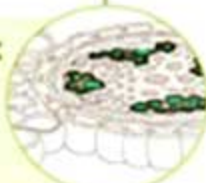
## 3 Endodermis layer :

It follows the cortex layer.



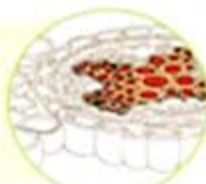
## 4 Xylem (wood) layer :

It follows the endodermis layer.



## 5 Pith layer :

It is the last layer that follows the xylem layer.



ready made slide  
epidermis layer  
cortex

شريحة جاهزة  
طبقة البشرة  
الفشرة examining  
cross-section  
xylem

فحص  
قطاع عرضي  
الخشب extended  
pith

ممتد  
اللب/اللحاء



## Unit Four

## Its function :

- It is branched and extended through the soil particles to allow :
  - Fixing** the plant in the soil.
  - Absorbing** water and mineral salts from the soil.



G.R.

**Root system is very important for the plant.**

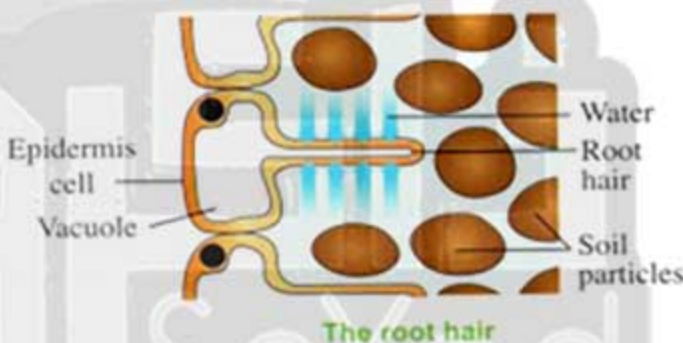
Because the root system fixes the plant in the soil and also it absorbs water and mineral salts needed for the plant from the soil.



## 2 Root hair (capillary) :

## Its structure :

- It extends from the epidermis cells of the root.
- It has a **big vacuole** that contains salt solution.



## The suitability of root hair for absorption of water and mineral salts :

- Its cell membrane has selective permeability

G.R.

**To** allow some types of salts to pass according to the plant's need.

- The concentration of the salt solution inside its vacuole is higher than that in the soil

G.R.

**To** help water to be transported from soil to the root hairs by the osmosis feature.

branched  
vacuole  
capillary

منفرعة osmosis feature  
فجوة concentration  
شعيرة

الخاصية الأسموزية  
تركيز



THE  
LESSON

## Selective permeability

It is a process by which the cell membrane of the root hair allows some types of salts to pass according to the plant's need.

## Osmosis feature

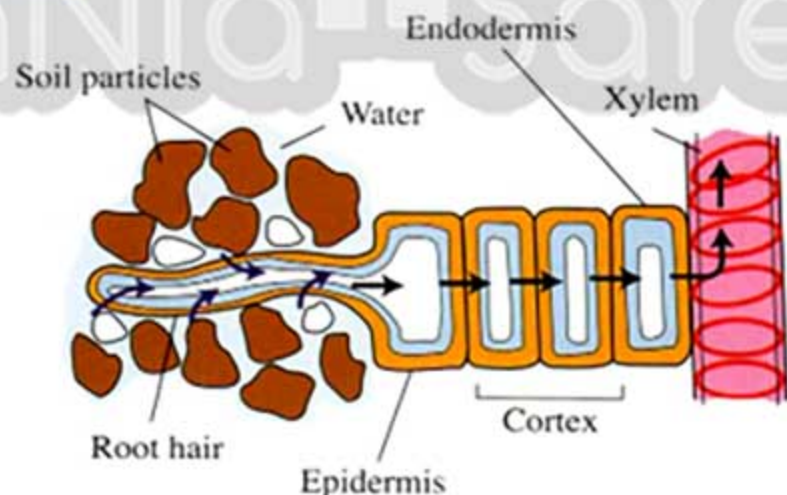
It is the transmission of water molecules through semi-permeable membrane from an area with high concentration of water to an area with low concentration of water.

## NOTES

1. The high concentration of salt solution means that it contains a small amount of water, so this solution has low concentration of water.
2. The low concentration of salt solution means that it contains a big amount of water, so this solution has high concentration of water.

## Second Transmission of water and dissolved mineral salts (solutes) from the root to the other parts of the plant to make its food

The transmission of water from soil to the vacuole of the root hair occurs by osmosis feature, while mineral salts are transmitted from soil by selective permeability, where :



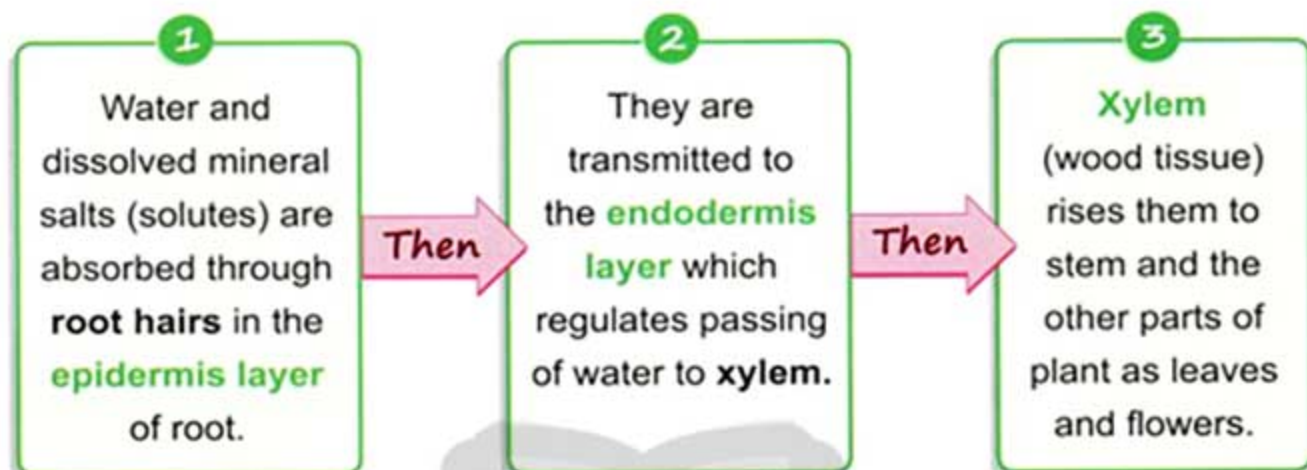
selective permeability  
semi-permeable

النفذية الاختيارية  
شبه منفذ salt solution

محلول ملح



## Unit Four



**But,** after reaching water and mineral salts all the parts of the plant, the plant must get rid of the excess water through holes called stomata by the transpiration process.

## Transpiration process

It is a vital process by which the plant loses excess water in the form of water vapour through stomata which spread on the two surfaces of the leaf and other green parts to the surrounding environment of the plant.



## Activity

To show the transpiration process.



## Materials:

- Bell jar.
- Growing plant in a planter.
- Glass board.
- Vaseline.
- Fabric.



## Steps:

1. Cover the soil and the planter with a fabric coated with vaseline.
2. Tie the fabric around the base of the stem tightly to prevent loss of water from the soil and planter walls.



stomata  
vital process

fabric  
تغور  
عملية حيوية  
Transpiration process

قماش / نسيج  
عملية النتح





## THE LESSON

- Put the planter under the bell jar and over the glass board.
- Leave the plant for several hours.

**Observation:**

Water drops are condensed on the inner surface of the bell jar.

**Conclusion:**

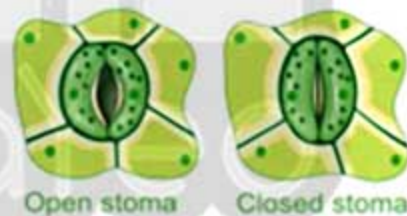
The green parts of plant get rid of the excess water through stomata by transpiration process.

**NOTE**

When the plant loses water by transpiration process this creates a pulling force that raises water and dissolved salts (solutes) upwards to the plant top.

**Stomata :****Stomata**

They are tiny holes spread on the two surfaces of the plant leaves and other green parts through which the plant gets rid of excess water.



- Stomata are widely spread on the lower surface of the plant leaves.
- Each stoma is surrounded by two guard cells.

**The function of the two guard cells :**

They control opening and closing the stoma by changing their shapes.

glass board  
creates  
pulling force

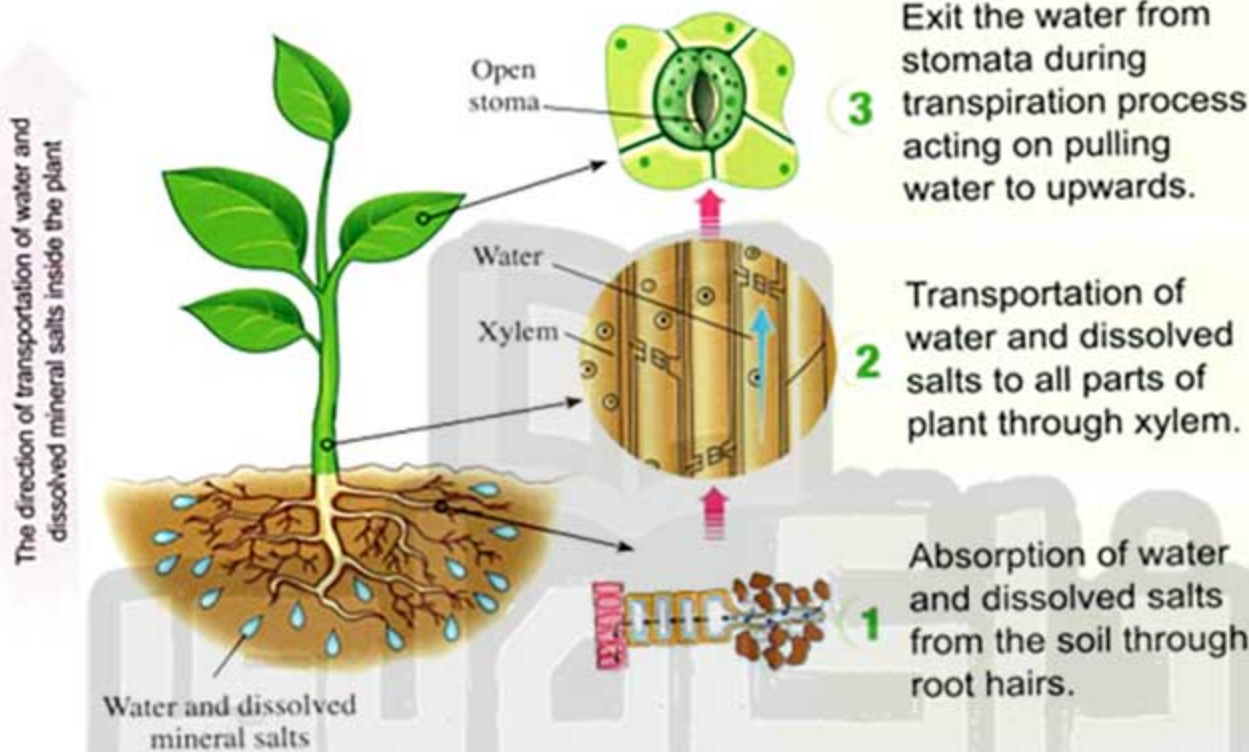
لوح زجاج tiny holes  
تخلق guard cells  
قوة شد

ثقوب صغيرة  
خلايا حارسة



## Unit Four

### The role of transpiration process in raising water and dissolved mineral salts (solutes) to upwards :



#### Try to answer

- Worksheet 9
- General exercise of the school book on Unit 4
- Model exams on Unit 4 in the Notebook.



# Remember



- The plant consists of root system and shoot system.
- Carbon dioxide + Water and mineral salts + Light energy  $\xrightarrow{\text{Photosynthesis process}}$  Oxygen + Plant food
- The root system consists of epidermis layer, cortex layer, endodermis layer, xylem and pith layer.

Osmosis feature	Selective permeability
It is the transmission of water molecules through semi-permeable membrane from an area with high concentration of water to an area with low concentration of water.	It is a process by which the cell membrane of the root hair allows some types of salts to pass according to the plant's need.

- The transmission of water from soil to the vacuole of the root hair occurs by **osmosis feature**, while mineral salts are transmitted from soil by **selective permeability**.

High concentration of water  
(Low concentration of salt)

Water movement by  
osmosis feature


High concentration of salt  
Low concentration of water

- Transpiration process** : It is a vital process by which the plant loses excess water in the form of water vapour through stomata which spread on the two surfaces of the leaf and other green parts to the surrounding environment of the plant.
- The green parts of plant get rid of the excess water through **stomata** by **transpiration process**.
- Each stomata is surrounded by **two guard cells**.




# Questions on the lesson



Questions signed by  have been taken from the school book.

## 1. Choose the correct answer :

- The plant makes its own food through ..... process.  
a. respiration      b. digestion      c. sensation      d. photosynthesis
- Plants get mineral salts from the .....  
a. soil.      b. air.      c. photosynthesis.      d. sunlight.
- Plant absorbs water by .....  
a. flowers.      b. root hairs.      c. stem.      d. leaves.
- The root system .....  
a. is extended through the soil to fix the plant.  
b. covers a large area of the soil to search for water and mineral salts.  
c. absorbs water and mineral salts.  
d. (a) , (b) and (c).
- The layers of the plant root is arranged from outside to inside as follows .....  
a. epidermis → cortex → endodermis → xylem → pith.  
b. cortex → epidermis → xylem → pith → endodermis.  
c. xylem → pith → cortex → epidermis → endodermis.  
d. pith → cortex → xylem → endodermis → epidermis.
- ..... absorb water and mineral salts from the soil. (Alex. 2016)  
a. Leaves      b. Root hairs      c. Stems      d. Flowers
- The layer that follows the cortex layer is called .....  
a. epidermis.      b. xylem.      c. endodermis.      d. pith.
- The layer that follows the epidermis layer is .....  
a. cortex layer.      b. wood layer.      c. pith layer.      d. endodermis.
- Root hairs extend from cells of ..... layer.  
a. epidermis      b. cortex      c. endodermis      d. xylem
-  Root hairs absorb water by ..... (Cairo & Kafr El-Sheikh 2017)  
a. swallowing.      b. osmosis.  
c. selective permeability feature.      d. respiration.



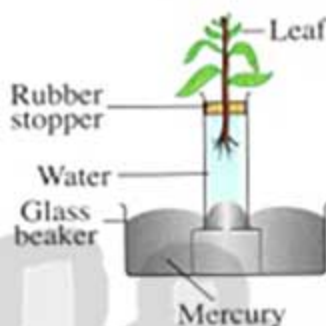
## THE LESSON

11. .... of the root hair membrane allows only some salts to pass through according to the plant's need. (Fayoum 2015)  
a. Osmosis                                      b. Selective permeability  
c. Evaporation                                d. Respiration
12. The transportation of water from the soil to the root hairs occurs due to .....  
a. the concentration of the salt inside the soil is higher than the concentration of salt in the root hair vacuole.  
b. the concentration of water in the root hair vacuole is lower than the concentration of water in the soil.  
c. the concentration of salt in the root hair vacuole is higher than the concentration of salt in the soil.  
d. (b) and (c) are correct.
13. 📖 Plant loses water in the form of water vapour in ..... process. (Giza & Dakahlia 2017)  
a. absorption          b. transpiration      c. osmosis              d. photosynthesis
14. Transpiration is a vital process, where the plant is ..... water.  
a. gaining              b. absorbing            c. losing                 d. (a), (b) and (c)
15. .... creates a pulling force that raises water and dissolved substances to the top. (Port Said 2016)  
a. Respiration          b. Evaporation        c. Transpiration       d. Absorption
16. Tiny holes in the plant leaves are called ..... (Cairo 2016)  
a. roots.                b. stomata.            c. seeds.                d. root hairs.
17. Plants get rid of excess water through the .....  
a. root hairs.            b. soil.                  c. stomata.              d. roots.
18. 📖 Stomata are widely spread on ..... (Cairo & Beheira 2017)  
a. stem.    b. upper surface of the leaf.  
c. lower surface of the leaf.                d. root.
19. The stoma in a plant is surrounded by ..... guard cells. (Red Sea 2016)  
a. two    b. three    c. four    d. five
20. Water rises from root to stem through ..... layer. (Damietta 2017)  
a. epidermis            b. endodermis          c. cortex                                        d. wood



## Unit Four

21. The selective permeability property in plant root allows .....
- losing of water in the form of water vapour from the plant.
  - absorbing water from soil.
  - the passage of some salts only according to the plant's need.
  - the respiration process.
22. The following figure represents an experiment you have made during your studies. Which of the following you will notice after several days of experiment start ? .....
- Mercury level will reduce.
  - Mercury level will rise.
  - Mercury level will remain the same.
  - (a) , (b) and (c).



## 2. Choose from column (B) what suits in column (A) :

(A)

(A)	(B)
1. Osmosis	a. is a process by which a plant makes its food.
2. Transpiration	b. is a process by which a plant gets rid of the excess water.
3. Photosynthesis	c. is a process by which a plant absorbs water from the soil.

1. ....

2. ....

3. ....

(B)

(A)	(B)
1. Wood tissue	a. gets rid of excess water.
2. Epidermis	b. transports water from root to other parts of the plant.
3. Stoma	c. regulates passing of water to wood tissue.
4. Endodermis	d. root hairs emerge from it.

1. ....

2. ....

3. ....

4. ....



THE  
LESSON

## 3. Put (✓) in front of the right statement and (×) in front of the wrong one, then correct it :





1. Green plants depend on raw materials in the photosynthesis process. ( )
2. Plants use carbon dioxide and water in the presence of light to make photosynthesis process. ( )
3. Calcium, nitrogen and zinc are elements necessary for the plant's life. ( )
4. The outermost layer of the plant's root is cortex. ( )
5. Plants absorb water and mineral salts from the soil by the root hairs. ( )
6. Root hairs extend from the cells of the endodermis layer. (Damietta 2017) ( )
7. The concentration of the solution inside the sap vacuoles of the root hairs is higher than that of the soil. (El-Minia 2017) ( )
8. The root system in plants is responsible for photosynthesis process. ( )
9. The cell membrane of the root hair has the osmosis property which allows only some salts to pass through. ( )
10. Water rises inside the plant stem through the wood tissue. ( )
11. Osmosis is a biological process in which the plant loses water in the form of water vapour. (Assiut 2017) ( )
12. Endodermis layer regulates the passing of water to the xylem. ( )  
(Ismailia & Qena 2016)
13. Transpiration is the losing of water in the shape of water droplets. ( )  
(El-Menofia 2016)
14. The stoma is surrounded by three guard cells that change their shapes to open and close the stoma. (Ismailia 2016) ( )
15. Stomata are widely spread on the upper surface of the plant leaves. (Ismailia & Aswan 2017) ( )

## 4. Correct the underlined words in the following statements :

1. Stem extends and penetrates the soil to increase the absorption process. ( )
2. Respiration process contributes in transmission of water and dissolved salts to the top of the plant. ( )
3. Plant loses water in the form of water vapour in photosynthesis process. (Ismailia 2017) ( )
4. Plant stoma is surrounded by two woody cells. (Sharkia 2017) ( )



## 5. Write the scientific term of each of the following :

1. The vital process by which green plants make their own food. (.....)
2. A biological process through which green plants form their food from raw materials in their environment. (.....)
3. The energy needed for the plant to form its food. (El-Menofia 2016) (.....)
4. A part of the plant that penetrates through the soil particles and fixes it. (Sharkia & Assiut 2017) (.....)
5. A part of the plant through which plant absorbs water and mineral salts from the soil. (.....)
6.  A structure extends from the root wall to absorb water. (Beheira & Sohag 2016) (.....)
7. The root layer, where the root hairs extend. (.....)
8. The outermost layer of the plant root. (.....)
9. A structure in the root hairs that contains a concentrated salt solution. (.....)
10.  A structure in the plant, where water passes through it from root to stem, then to leaves. (Matrouh 2017) (.....)
11.  Transmission of water molecules through a semi-permeable membrane from an area with a low concentrated solution to an area with a high concentrated solution. (Gharbia 2015) (.....)
12. Losing of water in the form of water vapour from the plant leaves through tiny holes called stomata. (Cairo 2017) (.....)
13. A process that helps in the flow of water from the soil to the root hair through a semi-permeable membrane. (.....)
14. The phenomenon by which water is transported from the soil to the big vacuole of the root hair. (.....)
15. A composition of cells in the root of the plant which regulates water passing to xylem. (El-Menofia 2017) (.....)
16.  A biological process through which plants lose water in the form of vapour from the plant leaves through stomata. (North Sinai 2017) (.....)
17. The last layer in the structure of the root. (.....)
18. A system in the plant that is branched and extended through the soil to fix the plant. (.....)



THE  
LESSON

19. The layer that follows the epidermis layer. (.....)
20. Small holes that are widely spread on the lower surface of the leaf.  
(Beni-Suef 2017) (.....)
21. They are tiny holes found on both surfaces of plant leaves. (.....)  
(Dakahlia 2017)
22. It loses water from the plant in the form of water vapour. (.....)
23. The process by which plants lose the excess water. (.....)
24. Two cells that surround the leaf stoma. (Alex. & Bohaira 2017) (.....)
25. Openings through which the plant undergoes the transpiration process.  
(.....)
26. The ability of the cell membrane of a root hair to allow some salts to  
pass through it according to the plant's need. (Fayoum 2016) (.....)

## 6. Complete the following statements :

1. Plants do ..... process to make their own food.
2. The plant takes ..... from air and water from soil with the presence of  
light to form its food by ..... process.
3. Among examples of mineral salts that are necessary for plant's life are  
calcium, ....., magnesium, ..... and zinc.
4. Any plant consists of root system and .....
5. Plants absorb water and mineral salts from the soil by ..... in their roots.
6. In the plant root, the epidermis layer is followed by ..... layer,  
then endodermis layer that is followed by ..... layer, then ..... layer.
7. The outermost layer of a plant root is called .....
8. The innermost layer of a plant root is called .....
9. .... follows the epidermis layer, while ..... follows the cortex layer.
10. Root hairs extend from ..... layer of the .....
11. The root system in plant is subdivided and extended through the soil  
..... to ..... the plant in the soil.
12. .... system fixes the plant in the soil.
13. Root hairs have a big ..... that contains ..... solution.
14. The concentration of the ..... inside the root hair vacuole is ..... than  
the concentration of the salt solution in soil.



## Unit Four

15. The cell membrane of the root hair has ..... which allows some salts to pass through. (Cairo 2017)
16. The process that allows some salts to pass according to the plant's need is called ..... (El-Menofia 2016)
17. Water is transmitted from the soil to the vacuole of the root hair by ..... , while mineral salts are transmitted by ..... (Damietta 2017)
18. Plants lose water in the form of the water vapour through ..... process.
19. Stomata are widely spread on the ..... surface of the plant leaf.
20. The ..... are small openings that are widely spread on the ..... surface of the plant leaves. (Gharbia 2016)
21. Each stoma is surrounded by ..... cells that change their shapes to close and open the stoma.
22. The ..... in plant is surrounded by two guard cells. (Suez & Sohag 2017)
23. The plant loses some of its water through ..... spread on plant leaves in a process called ..... (Ismailia & Qena 2016)
24. On both surfaces of the most plant leaves, there are tiny holes called ..... through which ..... process takes place.
25. The ..... process in the plant creates a pulling force that raises water upwards.

## 7. Give reasons for the following :

1. Green plants need some raw materials in the presence of light.  
.....
2. Plants make photosynthesis process.  
.....
3. Plant's root is branched and extended through the soil particles.  
.....  
.....
4. Root hairs can absorb water from the soil.  
.....
5. The concentration of solution inside the root hair vacuole is higher than the concentration of soil solution. (Alex. 2017)  
.....



THE  
LESSON

6. Presence of holes (stomata) on the lower surface of the plant leaves.

7. Each stoma is surrounded by two guard cells.

(Ismailia 2017)

8. Water flows from the soil to the root hairs.

9. The two guard cells change their shapes from time to time.

### 8. What happens if ... ?

1. A plant is kept in dark for a long period of time.

2. Root system is not extended between the soil particles.

3. • The concentration of soil solution is higher than the concentration of the solution inside the root hairs.

• The concentration of the solution decreases inside the sap vacuole.

(Damietta 2017)

4. The wood tissue disappears from a plant.

5. The two guard cells of a stoma cannot change their shapes.

6. There are no stomata in the plant leaves.

7. The plant carries out transpiration process inside a bell jar.

(Gharbia & Fayoum 2015)

8. There is no osmosis feature in the plant.

(Port Said & Red Sea 2017)

9. Absence of cell membrane of the root hairs.



## Unit Four

## 9. What is meant by ... ?

1. Transpiration process.

(Kalyoubia &amp; Red Sea 2017)

2. Osmosis feature.

3. Selective permeability.

(Port Said &amp; Matrouh 2017)

## 10. Rearrange the layers of the root from inside to outside.

## 11. What is the function of ... ?

1. Root system of the plant.

(Giza 2017)

2. Stomata.

(Port Said 2017)

3. Two guard cells surrounding the stoma.

(Dakahlia &amp; Damietta 2017)

4. Root hairs.

5. Endodermis.

(Damietta 2015)

## 12. Rearrange the following steps to explain the transmission and rising of water and mineral salts :

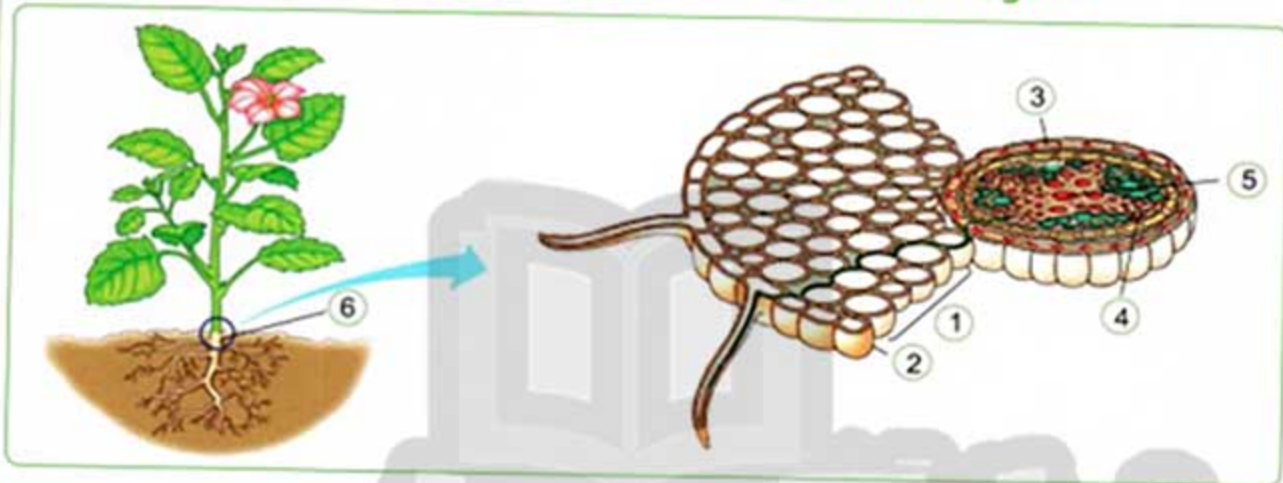
- (1) Mineral salts are transmitted from the soil to the root hairs by selective permeability and water is transmitted from the soil by osmosis feature.
- (2) Xylem rises water and dissolved mineral salts to reach the stem and other parts of the plant as leaves and flowers.



## THE LESSON

- (3) The transmission of water and salts from endodermis to xylem.  
 (4) The transmission of water and mineral salts from epidermis to cortex layer.

13. Identify the opposite figure, then write the labels on the figure :



This figure represents .....

- ① .....  
 ③ .....  
 ⑤ .....

- ② .....  
 ④ .....  
 ⑥ .....

(Port Said 2016)

14. Look at the opposite figures that show the structure of stomata.

1. Label the figures.

- ① .....  
 ② .....

2. Figure (a) represents ..... ,  
 while figure (b) represents .....

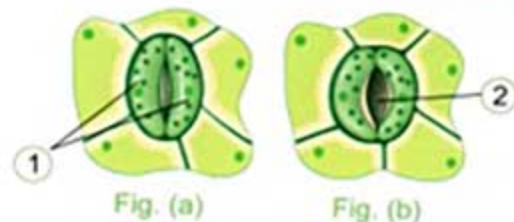


Fig. (a)

Fig. (b)



# Timss Questions



1. Aya has a potted plant. She sets up an experiment that shows that water travels through a plant into the air.

Which experiment would show this ?

- Put water in a container under the pot, water will disappear from the container.
- Cover the soil and the planter with a fabric coated with vaseline and put the planter under a bell jar, drops of water will be seen on the inner surface of the bell jar.
- Place a cut stem from the plant in a plastic bag, water will be seen in the bag.
- Place a cut stem from the plant in a glass of coloured water, the plant's leaves will change colour.



2. Which equation summarizes the process of photosynthesis ?

- Water + Carbon dioxide + Energy  $\longrightarrow$  Sugar + Oxygen
- Oxygen + Sugar  $\longrightarrow$  Carbon dioxide + Water + Energy
- Carbon dioxide + Oxygen + Water  $\longrightarrow$  Sugar + Energy
- Sugar + Carbon dioxide + Energy  $\longrightarrow$  Oxygen + Water

3. Plant makes photosynthesis process and absorbs zinc, phosphorus and iron elements, while it leaves sulphur element in the soil.

Name the process illustrated.



THE  
LESSON

4. Look at the following figure that shows an activity you have studied, then answer :

1. Why we tie the fabric around the base of the stem tightly ? .....

- To allow loss of water from the soil.
- To prevent loss of water from the soil.
- To allow loss of water from the soil and planter walls.
- To prevent loss of water from the soil and planter walls.



2. Water drops are condensed on the inner surface of the bell jar because .....

- the green parts of plant get rid of the excess water through stomata.
- the green parts of plant get rid of the excess water by the photosynthesis process.
- the green parts of plant get rid of the excess water by transpiration process.
- (a) and (c).



PART

1

# Worksheets





## Unit one

## Lesson 1

Total mark  
25

## Worksheet 1

Answer each of the following questions :

## 1. Complete the following statements :

(5 marks)

1. The crowbar is considered a ..... class lever but the ..... is a third class lever.
2. In the second class lever, the ..... lies between ..... and .....
3. Hockey bat is a lever that used to increase the ..... of the ball.
4. Wheelbarrow and nutcracker have the ..... between fulcrum and .....
5. .... are levers that used to pick up the very small objects, while ..... is a lever that used to move the object for a longer distance.

## 2. [A] Give reasons for :

(5 marks)

1. Levers are very important in our daily life.

2. Seesaw is considered as a first class lever.

## [B] Correct the underlined words :

1. Second class levers are the most popular type of levers in our daily life.

(.....)

2. Coal holder is a first class lever.

(.....)

3. In the third class lever, the fulcrum lies between the effort force and the resistance force.

(.....)

## 3. Put the symbols shown in the opposite table in the right order to illustrate the different types of levers in fig. (1), fig. (2) and fig.(3) :

(5 marks)




Item	Symbol
Fulcrum	
Effort force	
Resistance force	

Fig. (1)  
First class leverFig. (2)  
Second class leverFig. (3)  
Third class lever



## Worksheets

## 4. [A] What is meant by ... ?

(5 marks)

1. The lever.

2. Third class lever.

## [B] Write the scientific term :

1. The fixed point at which the lever rotates.

( ..... )

2. Levers that have fulcrum between the effort force and resistance force.

( ..... )

3. Levers that have the resistance force between the effort force and fulcrum.

( ..... )

## 5. Classify the following levers according to their type in the table below : (5 marks)

Pincers – Tweezers – Nail clippers – Bottle opener – Stapler – Ice holder – Nutcracker – Hammer claw – Fishing tool.

First class levers	Second class levers	Third class levers
.....	.....	.....
.....	.....	.....
.....	.....	.....



## Unit one

## Lesson 2

Total mark  
25

## Worksheet 2

Answer each of the following questions :

## 1. Complete the following statements :

(5 marks)

1. In the second class levers, the arm of ..... is always longer than the arm of .....
2. Effort force  $\times$  ..... = .....  $\times$  .....
3. The ..... class levers always don't save effort.
4. A lever has a mechanical benefit when ..... is longer than .....
5. In the third class lever, the ..... force always greater than ..... force.

## 2. [A] What happens if ... ?

(5 marks)

1. The effort arm is longer than the resistance arm.  
.....  
.....

2. The amount of effort force is equal to the amount of resistance force.  
.....  
.....

3. The length of effort arm is half the length of resistance arm.  
.....  
.....

## [B] Correct the underlined words :

1. Levers of the second class always have no mechanical benefit.

(.....)

2. The effort arm is always longer than the resistance arm  
in the third class lever.

(.....)

## 3. Solve the following problems :

(5 marks)

1. The length of effort arm of a crowbar is 160 cm, and the length of resistance arm is 60 cm. If the value of effort force equals 30 Newton.

Calculate the value of resistance force and mention the type of this lever.

.....  
 .....  
 .....



## Worksheets

2. In a first class lever, the resistance force equals 60 Newton. Calculate the length of the resistance arm. (knowing that the effort force  $\times$  its arm equal 300).

.....

.....

.....

4. Compare between the three types of levers : (5 marks)

Points of comparison	First class levers	Second class levers	Third class levers
1. Definition :	.....	.....	.....
2. Conservation of effort :	.....	.....	.....
3. Example :	.....	.....	.....

5. [A] Write the scientific term : (5 marks)

- The distance between the resistance force and fulcrum. (.....)
- The distance between the effort force and fulcrum. (.....)

- [B] Determine by drawing the number of weights which must be placed at a distance of one hole of fulcrum to become the lever balance, where the distance between every two holes is 1 cm.

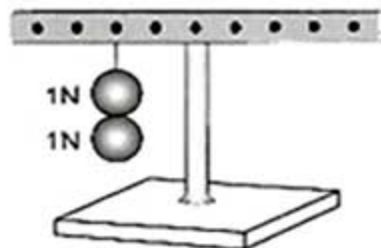


Fig. (a)

.....

.....

.....

.....

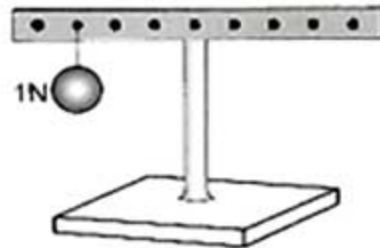


Fig. (b)

.....

.....

.....

.....



1  
UNIT

## General Exercise of the School Book on

## 1. Match column (A) with its correspondence in column (B):

(A)	(B)
1. Levers that always conserve the effort.	a. First class levers.
2. Levers that not conserve the effort.	b. Second class levers.
3. Levers that sometimes conserve the effort.	c. Third class levers.
4. A fixed point that a rigid bar rotates around.	d. The lever.
5. A rigid bar rotates around a fixed point, and is affected by a force and a resistance.	e. The force.
	f. The resistance.
	g. The fulcrum.

1. .... 2. .... 3. ....  
4. .... 5. .... 6. ....

## 2. Put (✓) or (x) in front of each of the following sentences and correct the false ones :

1. The first class levers have the resistance between the force and the fulcrum. ( )  
.....  
2. The second class levers have the force between the resistance and the fulcrum. ( )  
.....  
3. The third class levers have the fulcrum between the force and the resistance. ( )  
.....  
4. The crowbar is an example of the first class levers. ( )  
.....  
5. If the arm of force is shorter than the arm of resistance, then the lever conserves effort. ( )  
.....

## 3. Complete the following sentences :

1. The nutcracker is an example of the ..... levers.  
2. The manual broom is an example of the ..... levers.  
3. The scissors are example of the ..... levers.  
4. Force  $\times$  its arm = .....  $\times$  .....  
5. The type of the levers where the arm of force and the arm of resistance are equal is .....



## Worksheets

4. Compare between the three types of levers using the following table :

Points of comparison	First class lever	Second class lever	Third class lever
Definition :	..... ..... .....	..... ..... .....	..... ..... .....
Conservation of effort :	.....	.....	.....
Examples :	..... .....	..... .....	..... .....

5. Classify the following tools according to the type of lever :



1. ....



2. ....



3. ....



4. ....



5. ....



6. ....

6. The affecting force on a second class lever equals 200 Newton and the length of its arm is 50 cm. if the value of the resistance force 1000 Newton, calculate the value of the arm of resistance.

.....  
.....

7. The length of the force arm of a third class lever is 5 cm, and the length of the arm of the resistance is 15 cm. if the resistance force has a value of 300 Newton, calculate the value of the affecting force

.....  
.....



Total mark

25

## Model Exam

1

## on Unit one

Answer each of the following questions :

## 1. Complete the following statements :

(5 marks)

1. Levers make tasks easier by means of ..... and .....
2. Nutcracker has a mechanical benefit, because ..... is longer than .....
3. Water pump is considered a ..... class lever, while the manual broom is ..... class lever.
4. In the third class levers, the ..... is between the fulcrum and .....
5. The resistance arm is the distance between ..... and .....

## 2. [A] Give reasons for :

(5 marks)

1. Crowbar and tweezer are levers.

2. The second class levers always save effort.

## [B] Write the scientific term :

1. The most popular type of levers in our daily Life. ( ..... )
2. A force that increases when the resistance arm is longer than the effort force arm. ( ..... )
3. They are simple machines that always save effort. ( ..... )

## 3. Choose the correct answer :

(5 marks)

1. All the following are from the first class levers except .....  
a. the crowbar.      b. the scissors.      c. the nutcracker.      d. the seesaw.
2. Sweet holder is from the ..... class levers.  
a. first      b. second      c. third      d. fourth
3. When the arm of resistance ..... the arm of force, the effort force equals the resistance force.  
a. >      b. <      c. =      d. ≠



## Worksheets

4. All the following are from the importance of levers except .....
- increasing force.
  - decreasing speed.
  - increasing speed.
  - increasing distance.
5. Which of the following levers doesn't save effort ? .....
- Nutcracker.
  - Stapler.
  - Manual broom.
  - Wheelbarrow.

## 4. [A] What happens when ... ?

(5 marks)

- The force arm is shorter than the resistance arm in the lever.  
.....
- Both of resistance arm and effort force arm equal 5 meters.  
.....

## [B] Correct the underlined words :

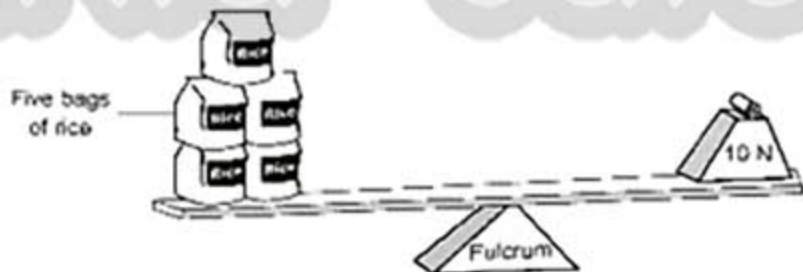
- Wheelbarrow is a first class lever. (.....)
- Coal holder is used to increase distance. (.....)
- The third class levers always save effort. (.....)

## 5. [A] Mention one example of lever used for :

(5 marks)

- Moving force from one place to another ; .....
- Accuracy in performance ; .....

[B] The following figure shows five identical bags of rice are balanced with an effort force equals 10N.



## Choose the correct answer :

- Each bag of rice is balanced with an effort force equals .....

  - 1N.
  - 2N.
  - 10N.
  - 5N.

- If we remove one bag of rice, So the remained four bags of rice are balanced with an effort force equals .....

  - 10N.
  - 2N.
  - 4N.
  - 8N.

(Note : the place of fulcrum is fixed and can not be changed.)



Total mark

25

## Model Exam

2

## on Unit one

Answer each of the following questions :

## 1. [A] Choose the correct answer :

(5 marks)

- Resistance arm is sometimes equal to force arm in ..... class levers.  
a. first      b. second      c. third      d. first and third
- ..... is considered from first class levers.  
a. Nutcracker      b. Hammer claw      c. Ice holder      d. Fishing tool
- Which of the following levers is used to avoid dangers ? .....  
a. Tweezers.      b. Sweet holder.      c. Coal holder.      d. Scissors.

## [B] Give reasons for :

- Nutcracker is considered as an increasing force lever.  
.....
- The third class levers always don't conserve effort.  
.....

## 2. [A] Write the scientific term :

(5 marks)

- The type of levers that its mid point is the resistance force. ( ..... )
- Force  $\times$  its arm = Resistance  $\times$  its arm. ( ..... )
- A type of levers, where the effort force may be larger or smaller than the resistance force. ( ..... )

## [B] What is meant by ... ?

- Fulcrum.  
.....
- The effort force arm.  
.....

## 3. Complete the following statements :

(5 marks)

- When the arm of force is equal to the arm of resistance, then ..... is equal to .....
- The factors that determine the values of force and resistance are ..... and .....



## Worksheets

3. There is a conservation of effort in the first class levers if ..... is longer than .....
4. Stapler has the ..... between fulcrum and .....
5. When the length of each of the effort arm and the resistance arm equals 8 cm. and the resistance = 5 Newton, so the effort force equals .....

4. Put (✓) or (x) in front of each of the following sentences and correct the false ones : (5 marks)

1. Bottle opener, wheelbarrow and paddle are examples of second class levers. ( )
2. Hockey bat and tweezers have a mechanical benefit. ( )
3. The effort force arm is meseasured in Newton. ( )
4. Among the functions of levers is to decrease the speed. ( )
5. The resistance arm is the distance between the resistance force and fulcrum. ( )

5. [A] A force of 360 Newton and an arm of length 4 cm affect on a lever. (5 marks)

If the value of resistance equals 200 Newton, determine the location of the resistance to balance the lever.

[B] Choose from column (B) what suits it in column (A).

(A)	(B)
1. Levers always save effort.	a. Lever.
2. Levers always don't save effort.	b. Force.
3. Levers sometimes save effort.	c. Third class.
4. A rigid bar rotates around a fixed point and is affected by a force and a resistance.	d. Second class.
	e. First class.

1. .... 2. .... 3. .... 4. ....



## Unit Two

## Lesson 1

Total mark  
25

## Worksheet 3

Answer each of the following questions :

## 1. Write the scientific term :

(5 marks)

1. A type of lamp bases that has two side nails and two pieces of lead to connect the lamp with the electric circuit. (.....)
2. A type of electric lamps that has two filaments of tungsten and two points of connection. (.....)
3. A material that is used to cover the inner surface of the glass tube of fluorescent lamp. (.....)
4. A part of the lamp that heats and emits light when electric current passes through it. (.....)
5. They convert the electric energy into light energy. (.....)

## 2. [A] Correct the underlined words in the following sentences :

(5 marks)

1. Electric lamps contain hydrogen inert gas. (.....)
2. The filament of the light bulb is made of copper. (.....)
3. The light bulbs are the most popular source of natural light. (.....)

## [B] What happens if ... ?

1. The filament of the lamp is made of iron.  
.....  
.....
2. There is air inside the glass bulb.  
.....  
.....

## 3. Complete the following sentences :

(5 marks)

1. .... is the most popular source of artificial light and it is used in car lights, while .... is used in decorating the commercial stores.
2. .... is a coiled thin wire that made of tungsten.



## Worksheets

3. .... consists of a filament, glass bulb and the base of the light bulb, while .... consists of a glass tube, two filaments of tungsten and points of connection.
4. .... is an inert gas that increases the lifetime of the filament.
5. .... has a piece of lead, while the .... has two side nails and two pieces of lead.
6. .... allow the electric current to transfer from the base of the lamp to the tungsten filament.
7. The filament of the lamp is made of .... as it has high melting point.

#### 4. Put the following labels on the following figures :

(5 marks)

Tungsten filament – Points of connection – Copper and lead wires – Base of the light bulb – Glass bulb – A piece of lead – Glass tube.



#### 5. [A] Give reasons for :

(5 marks)

1. Copper and lead wires are very important in the light bulb.

.....

2. The glass bulb of the light bulb contains argon gas.

.....

3. Filaments of electric lamps are made of tungsten.

.....

#### [B] Mention the function of each of the following :

1. The points of connection in the fluorescent lamp :

.....

2. The filament :

.....



## Unit Two

## Lesson 1

Total mark  
25

## Worksheet 4

Answer each of the following questions :

## 1. Choose the correct answer :

(5 marks)

- The ..... is the continuous path through which the electric current passes.
  - open electric circuit
  - battery
  - closed electric circuit
  - lamp
- ..... works as a source of electric current in the electric circuit.
  - Lamp
  - Electric wire
  - Battery
  - Key
- The light bulbs are connected in ..... in the house.
  - parallel
  - series
  - parallel and series
  - series in some places and in parallel in the other places.
- In series connection, the light intensity of the light bulbs .....
  - decreases by increasing the number of the light bulbs.
  - increases by decreasing the number of the light bulbs.
  - increases by increasing the number of the light bulbs.
  - (a) or (b).
- By unscrewing one bulb from bulbs connected in parallel, .....
  - the electric current doesn't flow.
  - the electric current flows.
  - light intensity of the other bulbs is still constant.
  - (b) and (c).

## 2. Write the scientific term :

(5 marks)

- A way of connection, in which the light bulbs are connected one after another. (.....)
- A part of the electric circuit used to connect the battery to the lamp in the electric circuit. (.....)
- A way of connection, in which the light bulbs are connected in branching routes. (.....)

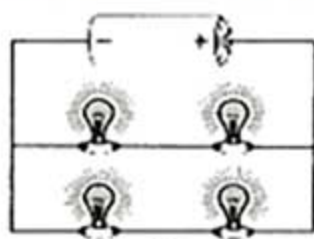


## Worksheets

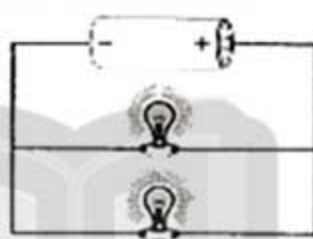
4. A way of connection, in which the light intensity remains constant by increasing or decreasing the number of lamps. ( ..... )
5. The way of connecting machines and all lamps in the house. ( ..... )

## 3. Look at the following circuits, then answer :

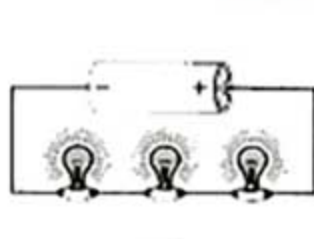
(5 marks)



(a)



(b)



(c)

1. Name one of the above circuits that has electric lamps connected in series? .....
2. In which circuit do the bulbs glow most brightly? .....
3. In which circuit do the bulbs glow least brightly? .....

## 4. Complete the following sentences :

(5 marks)

1. The electric circuit consists of ..... , ..... and .....
2. .... and ..... are methods to connect the electric lamps in the electric circuits.
3. In ..... connection, there is no branches, but in ..... connection, the light bulbs are connected in branching routs.
4. In parallel connection, the light intensity of the light bulbs ..... by increasing or decreasing the number of the light bulbs.
5. In series connection, the light intensity of the light bulbs ..... by increasing the number of the light bulbs.

## 5. [A] Give reasons for :

(5 marks)

1. Damage any of the lamps in a room doesn't affect the lamps in the other rooms of the house.

.....

.....

.....



2. On unscrewing one bulb from an electric circuit contains electric bulbs connected in series, the electric current doesn't flow.

3. When unscrewing one bulb from an electric circuit contains electric bulbs connected in parallel, the electric current flows.

[B] Explain by drawing only how can you connect two light bulbs :

1. In series

2. In parallel





## Unit Two

## Lesson 2

Total mark

25

## Worksheet 5

Answer each of the following questions :

## 1. Choose the correct answer :

(5 marks)

- Which of the following is from the indirect injuries ? .....
  - Fires resulting from electricity.
  - Falling from the top of a ladder.
  - The electric shock.
  - Burns resulting from the electric current.
- All the following materials are electric conductors except .....
  - iron.
  - copper.
  - aluminium.
  - wood.
- Fires caused by electricity are put out by .....
  - water.
  - sand.
  - air.
  - (a) and (b).
- Which of the following is (are) from the benefits of electricity ? .....
  - Cooking food.
  - Lighting houses and streets.
  - Operating some machines as televisions and washing machines.
  - (a) , (b) and (c).
- ..... occur as a result of the increase in the temperature of the electric machines.
  - The electric shocks
  - Burns resulting from the electric current
  - Fires resulting from electricity
  - Indirect injuries

## 2. Write the scientific term :

(5 marks)

- Materials that make the electric circuit open when they are connected with it. ( ..... )
- A danger results from plugging more than one machine to one socket that causes electric overload. ( ..... )
- A danger that results from not disconnecting the electric current from the electric machine that generates heat after use. ( ..... )
- Materials that allow the flow of electricity through them. ( ..... )
- The material that should not be used to put out electric fires. ( ..... )



### 3. [A] Compare between the regular fires and fires caused by electricity : (5 marks)

.....

.....

.....

.....

#### [B] Give reasons for :

1. Electricity is very important in our life.

.....

.....

2. Plugging more than one machine to one socket causes electric fires.

.....

.....

3. Copper is a good conductor of electricity.

.....

.....

### 4. [A] Complete the following statements : (5 marks)

1. .... and .... are dangers resulted from the improper use of electricity.

2. Iron is from ...., while .... is from electric insulators.

#### [B] Compare between the electric conductors and electric insulators.

.....

.....

.....

.....

.....

### 5. Look at the opposite figures, then answer :

1. In which figure the light bulb will light up when the electric wires connected to the bulb ? Why ?

.....

.....

.....

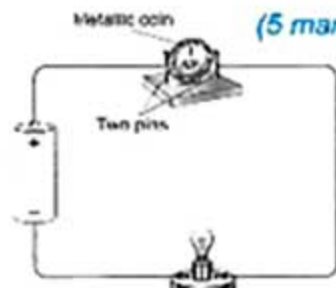


Fig. (a)



## Worksheets

2. In which figure the light bulb will not light up when the electric wires connected to the bulb ? Why ?

.....  
 .....  
 .....

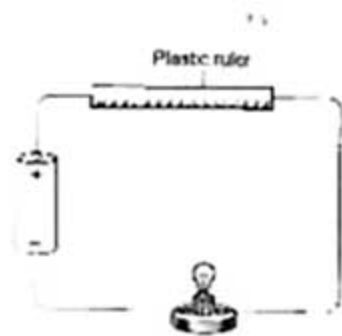


Fig. (b)

3. What do you conclude from the two figures ?

.....  
 .....  
 .....

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## Unit Two

## Lesson 2

Total mark  
25

## Worksheet 6

Answer each of the following questions :

1. Put (✓) or (x) in front of each behaviour in the following table : (5 marks)

The behaviour	(✓) or (x)
1. Leaving an electric machine connected with the electric current while taking a bath.	
2. Leaving wires naked and not insulated.	
3. Don't clean or fix an electric machine while it is connected to the electric current.	
4. Place several connections in the same socket.	
5. Placing a piece of plastic in the socket.	

2. [A] Correct the underlined words in the following sentences : (5 marks)

- The electric shock happens when plugging more than one machine to one socket. (.....)
- Water is not used in putting out electric fires because it is a bad conductor of electricity. (.....)
- Thermal glass is among electric conductor substance. (.....)

[B] Mention the type and the reason of this injury :

.....

.....

.....

.....



3. Write the scientific term : (5 marks)

- They are burns that result from electricity and cause the damage of the body tissues. (.....)
- A danger that results when a part of your body touches a wire that has an electric current and the other part touches the ground. (.....)



## Worksheets

3. A direct injury results when a part of your body touches spark resulting from the electric fires. ( ..... )
4. A danger that results when a part of your body touches a wire that has an electric current, but the other part touches a material conducting electricity. ( ..... )
5. An injury results when a part of your body touches a device that generates heat. ( ..... )

## 4. Choose the correct answer :

(5 marks)

1. All the following are from the precautions in dealing with electricity except .....
  - a. don't place flammable materials close to the electric machines that generate heat.
  - b. place a piece of plastic in the socket.
  - c. don't insert a nail in the socket.
  - d. play with the electric connections.
2. The electric burns happen when .....
  - a. a part of your body touches a source of electric current directly.
  - b. a part of your body touches a spark resulting from an electric fire.
  - c. a part of your body touches a wire that has an electric current and the other part touches the ground.
  - d. (a) and (b).
3. All the following reasons are from the reasons of the electric fires except .....
  - a. placing an electric machine that generates heat close to curtains.
  - b. plugging more than one machine in the same socket.
  - c. passing the electric current through the human body.
  - d. not disconnecting the electric current from the electric machine that generates heat.
4. .... results when your body is a part of an electric circuit.
 

a. Electric fire	b. Electric conductor
c. Electric burn	d. Electric shock
5. Burns that result from electricity and cause the damage of the body tissues are .....
 

a. electric fires.	b. electric shock.
c. electric burns.	d. indirect injuries.



5. [A] Mention three precautions in dealing with electricity.

(5 marks)

.....

.....

.....

.....

[B] Give reasons for :

1. Placing a piece of plastic in the socket.

.....

.....

2. We must not touch any electric machines with wet hands.

.....

.....

ذاكرولى  
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## General Exercise of the School Book on

## 1. Complete the following sentences :

1. .... and .... are two ways for connecting electricity.
2. .... and .... are some precautions should be taken while dealing with the electricity.
3. The simple electric circuit consists of .... and ....
4. .... and .... are examples of the electric insulating materials.
5. In the case of connecting the lamps in ...., the lighting of the lamps decreases with their increase in number.

## 2. Correct the underlined words :

1. The electric lamp converts the electric energy to the kinetic energy. ( ..... )
2. The filament of the light bulb is made of carbon. ( ..... )
3. While connecting the lamps in parallel the lamps are connected one after the other. ( ..... )
4. There are two connecting points at each end of the light bulb. ( ..... )
5. The electric fire occurs due to the passage of the electric current through the human body. ( ..... )
6. The electric lamps are connected in the house in series. ( ..... )
7. When the lamps in the electric circuit are connected in series, they continue to work if a lamp is damaged. ( ..... )
8. The glass bulb of the electric lamp contains hydrogen gas. ( ..... )
9. Wood is considered a good conductor of electricity. ( ..... )

## 3. Write the scientific explanation to each of the following :

1. The swelling (glass bulb) of the electric lamp contains an inert gas instead of air.  
.....
2. Not placing metallic things inside the socket.  
.....
3. There are connecting points at the ends of the fluorescent lamps.  
.....
4. Not placing flammable materials too close to the electric machines that generate heat.  
.....



**4. Compare between each of the following :**

1. Connecting electric lamps in series and connecting in parallel.

2. The light bulb and the fluorescent lamp in respect to structure.

3. The conducting materials of electricity and the non-conducting materials.

**5. Write the scientific term of each of the following :**

- Materials that allow the electric current to pass through it. ( .. )
- Fires occur due to the increase in the temperature of the electric wires. ( .. )
- Materials that don't allow the electric current to pass through it. ( .. )
- The way that electric lamps are connected one after another, and the intensity of the light of the lamps decreases with the increase in their number. ( .. )
- A tool used to convert the electric energy to light energy. ( .. )
- The way that the lamps are connected through branching routes and light of the lamps are not affected with the increase in their number. ( .. )
- One of the dangers of the electricity occurs due to the passage of the electric current through the human body. ( .. )
- One of the dangers of the electricity is that it destroys the tissue of the body. ( .. )

**6. Write your own paragraph on each of the following :**

1. The electric shock.

2. The electric fires.

3. The electric lamp.

4. The precautions that should be taken to deal with the electricity.



## Model Exam

1

## on Unit Two

25

Answer each of the following questions :

**1. Complete the following statements :**

(5 marks)

- The fluorescent lamps contain ..... gas and a little of .....
- Rubber is considered from the electric ..... , while copper is considered from the electric .....
- When connecting more than one bulb with the circuit in series, the light intensity .....
- In houses, the electric lamps are connected in .....
- The electric shock occurs as a result of passing ..... through the human body, in many cases it causes .....
- The ..... electric circuit consists of battery, lamp and .....

**2. [A] Give reasons for :**

(5 marks)

- There is a glass bulb around the filament.

- We shouldn't touch uncovered electric wires.

**[B] Write the scientific term :**

- They allow the electric current to pass from the base of the light bulb to the tungsten filament. (.....)
- The material that should be used to put out electric fires. (.....)
- A type of lamps their inner surface is covered with phosphoric material. (.....)

**3. Choose the correct answer :**

(5 marks)

- The electric shock may cause .....  
a. electric current.    b. electric burns.    c. electric fires.    d. electric overload.
- If we have four light bulbs and we need to get high light intensity, so we must connect them .....  
a. in series.    b. in parallel.    c. (a) and (b).    d. no correct answer.
- If we connect an eraser with an electric circuit, the .....  
a. electric circuit will be opened.    b. electric circuit will be closed.  
c. electric current will flow.    d. (b) and (c).



4. Which of the following gases is found in the fluorescent lamp but not in the light bulb ? .....
- a. Argon.                      b. Water vapour.                      c. Neon.                      d. Mercury vapour.
5. Electric wires must be covered with .....
- a. copper.                      b. iron.                      c. lead.                      d. plastic.

**4. [A] Correct the underlined words :** (5 marks)

- The electric lamp contains active gas to increase the lifetime of the filament. ( )
- The inventor of the electric light bulb is the scientist Archimedes. ( )
- The human body is a good conductor of electricity as it contains gases. ( )

**[B] What happens when ... ?**

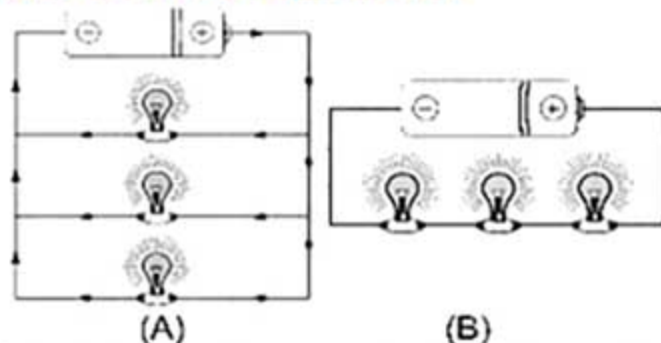
- One of the light bulbs is broken, while it is connected in series with the others.  
.....
- You insert a metallic bar in an electric socket.  
.....

**5. [A] Put (✓) or (x) :** (5 marks)

- The fluorescent lamp is known as neon lamp because it contains the inert neon gas. ( )
- We can use a piece of wood to push the injured person during electric accidents. ( )
- The spiral base has two side nails and two pieces of lead. ( )

**[B] Notice the two following figures then answer the questions :**

- Complete :** Figure (A) represents the way to connect the electric lamps in ....., while figure (B) represents their connection in .....



- Choose :** The lighting of the bulbs in figure (B) is .....

(more than - less than - equal to) the lighting of the same bulbs in figure (A).

- What happens if :** An electric lamp in figure (B) burns ?  
.....



## Model Exam

2

## on Unit Two

Total mark

25

Answer each of the following questions :

## 1. Choose the correct answer :

(5 marks)

- The inert gas that exists inside the light bulb is used to .....  
 a. decrease the amount of electricity.      b. decrease the lifetime of the filament.  
 c. increase the amount of electricity.      d. increase the lifetime of the filament.
- Water is not used in putting out fires caused by electricity, because .....  
 a. it is a bad conductor of electricity.      b. it is a good conductor of electricity.  
 c. it may evaporate.      d. no correct answer.
- All the following materials allow the flow of the electric current except .....  
 a. iron.      b. aluminium.      c. rubber.      d. copper.
- Tungsten is preferred to be used in the light bulb because it has .....  
 a. bad conductivity.      b. high melting point.  
 c. low density.      d. low melting point.
- Plugging many appliances to one socket may cause .....  
 a. heating up of wires.      b. electric overload.  
 c. fires.      d. (a) , (b) and (c).

## 2. [A] Write the scientific term :

(5 marks)

- A danger of electricity that happens when plugging more than one machine to one socket. (.....)
- Materials that don't allow electricity to flow through. (.....)
- It carries the lamp in upright position and connects the lamp to electricity. (.....)

## [B] What happens when ... ?

- The filament of the light bulb is made of iron.  
 .....
- The electric fires are put out by water.  
 .....

## 3. Complete the following statements :

(5 marks)

- Among the safety precautions when dealing with electricity are ..... and .....
- The electric current has only one path when the light bulbs are connected in .....



- The damage caused by electricity and lead to destroy the tissues of the body is called .....
- There are two types of lamp bases which are ..... base and ..... base.
- We should not place the flammable materials such as furniture and ..... close to electric machines that generate ..... such as ..... and electric iron.
- Electric lamps emit light when ..... passes through them.

#### 4. [A] Give reasons for :

(5 marks)

- The light bulbs are connected in parallel in the house.  
.....
- There are two points of connection at each tip of the fluorescent lamp.  
.....

#### [B] What is meant by ... ?

- Electric circuit.  
.....

- Electric fires.  
.....

- Parallel connection.  
.....

#### 5. [A] Compare between each one of the following :

(5 marks)

Points of comparison	Connecting in series	Connecting in parallel
1. Light intensity of the lamps :	..... .....	..... .....
2. Removing one of the lamps from the connection :	..... .....	..... .....

#### [B] Correct the underlined words :

- The inner surface of the tube of the fluorescent lamp is covered with a carbonic material. (.....)
- The glass bulb of the light lamp contains hydrogen gas. (.....)
- When we put a piece of plastic in an electric circuit, the electric current passes. (.....)



## Unit Three

## Lesson 1

Total mark  
25

## Worksheet

7

Answer each of the following questions :

## 1. Complete the following sentences :

(5 marks)

- Types of solar eclipse are ..... , ..... and .....
- The solar eclipse doesn't last more than ..... minutes and ..... seconds.
- ..... solar eclipse occurs when the Earth lies in the umbra region of the Moon.
- During solar eclipse, ..... lies between ..... and .....
- The annular eclipse occurs to the part of Earth that lies in the ..... of the Moon.

## 2. [A] Give reasons for :

(5 marks)

- Special glasses must be used to look at the solar eclipse.

- The type of solar eclipse differs according to the movement of the Moon in front of the Sun.

## [B] Correct the underlined words :

- Light travels in curved lines. (.....)
- The Moon revolves around the Earth in a circular orbit. (.....)
- When the Earth is in the semi-shaded area of the Moon, annular solar eclipse occurs. (.....)

## 3. [A] What happens if ... ?

(5 marks)

- A dark object is placed between a lighted candle and a screen.
- The Moon hides the sunlight completely from the Earth's surface.

## [B] Write the scientific term :

- The dark inner shadow area in which the total solar eclipse appears. (.....)
- The type of solar eclipse in which the Sun appears as a lighting ring. (.....)
- The faint outer shadow area in which the partial solar eclipse appears. (.....)



## 4. [A] What is meant by ... ?

(5 marks)

1. Total solar eclipse :

.....



.....

2. Partial solar eclipse :

.....

.....

[B] Choose from column (A) what suits in column (B) :

(A)	(B)
1. Partial solar eclipse	a. 
2. Annular solar eclipse	b. 
3. Total solar eclipse	c. 

1. ....

2. ....

3. ....

## 5. Examine the opposite figure, then answer :

(5 marks)

1. Label the figure :

① .....

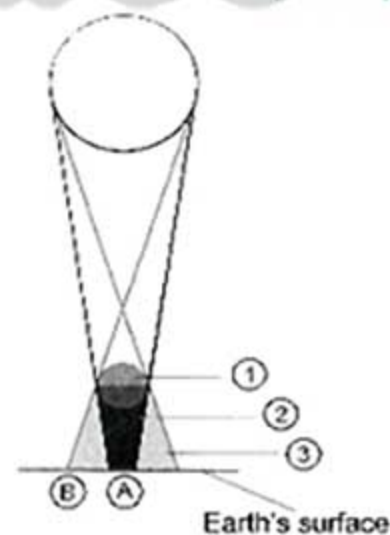
② .....

③ .....

2. Mention the type of solar eclipse occurs at :

(A) .....

(B) .....





Total mark  
25

## Unit Three

## Lesson 2

## Worksheet 8

Answer each of the following questions :

## 1. Complete the following sentences :

(5 marks)

- ..... occurs when the ..... comes between the Sun and the Moon.
- In the total lunar eclipse, the ..... Moon enters ..... area of Earth.
- Types of lunar eclipse are ..... and .....
- The lunar eclipse occurs in the ..... of the lunar month when the Moon phase is .....
- The lunar eclipse may last for more than .....
- In the total lunar eclipse the Sun, Earth and ..... are on one straight line.

## 2. [A] What happens when ... ?

(5 marks)

- The Earth blocks the sunlight from reaching the whole Moon.  
.....  
.....
- The Moon lies completely in the Earth's penumbra.  
.....  
.....

## [B] Correct the underlined words :

- The rate of occurrence of the lunar eclipse is five eclipses per month.  
( ..... )
- The Moon is coloured in blue at the start of total lunar eclipse. ( ..... )
- Annular solar eclipse occurs when the Moon enters completely in the umbra region of the Earth. ( ..... )

## 3. [A] Give reasons for :

(5 marks)

- No precautions or special devices are required during observing the lunar eclipse.  
.....  
.....



2. At the beginning of total lunar eclipse, the Moon appears in red colour.

[B] Write the scientific term :

- The lunar eclipse in which part of the Moon enters the Earth's umbra. (.....)
- The type of eclipse that can be seen at morning only. (.....)

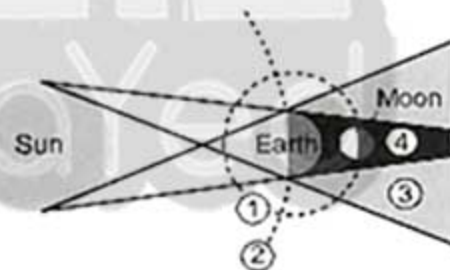
4. Compare between : (5 marks)

Points of comparison	Solar eclipse	Lunar eclipse
1. How does it occur ?	..... ..... ..... .....	..... ..... ..... .....
2. Its duration :	..... .....	..... .....

5. The opposite figure represents lunar eclipse phenomenon, observe it, then answer : (5 marks)

- The type of lunar eclipse is .....
- Label the figure.

- .....
- .....
- .....
- .....





## General Exercise of the School Book on

## 1. Justify :

1. We should not look at the Sun by the naked eye during the solar eclipse.

.....

.....

2. The type of the solar eclipse differs due to the movement of the Moon in front of the Sun.

.....

.....

3. No annular lunar eclipse is formed like the annular solar eclipse.

.....

.....

4. We can not see the Sun completely during the total solar eclipse.

.....

.....

## 2. Complete the following statements :

1. The ..... phenomenon occurs continuously when the ..... hides the sunlight from a part of the Earth during its passage in front of it.
2. .... occurs when the ..... comes between the Sun ray and a part or whole of the Moon.
3. .... solar eclipse is formed when the Moon is located in an orbit higher than the Earth.

## 3. Put a (✓) in front of the correct statements and a (x) in front of the false ones and correct the false :

1. Since the past, man has been observing the stars and planets, he managed to develop some accurate calculations of their movement in space. ( )
2. On the contrary of the solar eclipse, the lunar eclipse can be easily seen from the surface of the Earth by the naked eye. ( )
3. More than one type of solar eclipse can be observed. ( )



#### 4. Define the following terms :

1. Cone shadow (umbra).

.....

2. The penumbra.

.....

3. Total solar eclipse.

.....

4. Partial solar eclipse.

.....

5. Total lunar eclipse.

.....

#### 5. Compare between each of the following :

1. Solar and lunar eclipses.

.....

2. Total solar eclipse and annular solar eclipse.

.....

#### 6. Mention the scientific term :

1. It occurs to the Moon when it completely enters the shadow area of the Earth.

( ..... )

2. It occurs when a part of the Moon enters the shadow area only.

( ..... )

3. It occurs when the Moon comes between the Earth and the Sun on one straight line.

( ..... )



## Model Exam

1

## on Unit Three

Total mark

25

Answer each of the following questions :

## 1. Complete the following statements :

(5 marks)

1. Lunar eclipse phenomenon occurs when ..... is located between the Sun and .....
2. If we are in a place on the Earth's surface where the Moon shadow falls on the Earth, we can see .....
3. Total lunar eclipse is formed in the ..... area of the Earth, while partial solar eclipse is formed in the ..... area of the Moon.
4. The ..... eclipse takes place when the ..... lies in the antumbra of the Moon.
5. When the whole Moon enters the ..... of the Earth, the Moon light turns to be ..... without being eclipsed.
6. .... are used to observe the solar eclipse safely.

## 2. [A] Give reasons for :

(5 marks)

1. Occurrence of the solar eclipse.

2. There are two types of lunar eclipse occur in the umbra region of the Earth.

## [B] Correct the underlined words :

1. Penumbra is the dark inner shadow area in which the total solar eclipse appears. (.....)
2. Lunar eclipse occurs three times each year. (.....)
3. There are three types of lunar eclipse. (.....)

## 3. Choose the correct answer :

(5 marks)

1. .... occur(s) to the Sun only.

a. Total eclipse      b. Annular eclipse      c. Partial eclipse      d. (a) and (c)



2. The duration of solar eclipse is ..... that of lunar eclipse.  
a. shorter than      b. twice      c. longer than      d. equal to
3. The phenomenon of the lunar eclipse occurs ..... of the lunar month.  
a. in the middle      b. at the end      c. at the beginning      d. (a) and (c)
4. When the Moon blocks the sunlight from reaching the Earth's surface, it is called .....  
a. winter.      b. lunar eclipse.      c. cloudy weather.      d. solar eclipse.
5. .... occurs when the whole Moon enters the Earth's penumbra.  
a. Total lunar eclipse      b. Partial lunar eclipse  
c. Total solar eclipse      d. Lunar non-eclipse.

4. [A] Write the scientific term : (5 marks)

1. The Earth's shadow in which total lunar eclipse is formed. (.....)
2. The phenomenon which is seen at night from any place on Earth. (.....)
2. A type of solar eclipse in which we can't see the Sun completely. (.....)

[B] What happens when ... ?

1. The Moon lies in a higher orbit than Earth.  
.....
2. Someone doesn't use a special glasses during observing the lunar eclipse.  
.....

5. [A] Compare between total lunar eclipse and partial lunar eclipse : (5 marks)

.....

.....

.....

[B] Put (✓) or (x) :

1. The lunar eclipse can be seen at morning, while solar eclipse can be seen at night. ( )
2. The Moon revolves around the Earth in an oval shape orbit. ( )
3. The Moon is coloured in red at the start of total lunar eclipse. ( )



## Model Exam

2

## on Unit Three

Total mark

25

Answer each of the following questions :

## 1. Choose the correct answer :

(5 marks)

- Total lunar eclipse happens when .....
  - the whole Moon enters the shadow area of the Earth.
  - a part of the Moon enters the shadow area of the Earth.
  - the whole Moon enters the semi-shaded area of the Earth.
  - the moon lies between the Sun and the Earth.
- The annular solar eclipse takes place when the Moon comes in an orbit ..... the Earth.
  - lower than
  - higher than
  - parallel to
  - no correct answer
- In the total solar eclipse, the Moon size appears ..... the size of the Sun.
  - smaller than
  - larger than
  - equal to
  - more tiny than
- The partial lunar eclipse occurs when a part of the Moon enters the ..... of the Earth.
  - umbra
  - penumbra
  - antumbra
  - atmosphere
- Among the similarities between solar eclipse and lunar eclipse is that each of them .....
  - can be seen at morning.
  - lasts for 2 hours.
  - causes harms for eye.
  - is repeated at regular periods.

## 2. [A] Write the scientific term :

(5 marks)

- It is formed in the semi-shadow area of the Moon on the Earth and in which we can see part of the Sun. (.....)
- An area in which the whole Moon is located, where it is not considered an eclipse. (.....)
- Rays that emitted from the Sun during solar eclipse and may cause blindness in few minutes. (.....)

## [B] What happens if ... ?

- The Moon's umbra does not reach the Earth.

.....

- A part of the Moon enters the Earth's umbra.

.....



## 3. Complete the following statements :

(5 marks)

1. In the solar eclipse ..... is found between the Sun and .....
2. Lunar eclipse occurs in the ..... of the lunar month at a rate of ..... per year.
3. At the start of the total lunar eclipse the Moon is coloured in ..... due to the ..... of some infrared rays.
4. The type of solar eclipse differs according to the ..... of the Moon in front of the .....
5. The light of the Sun passes in ..... lines and when a dark object gets in the way of light, a ..... is formed.

## 4. [A] Give reasons for :

(5 marks)

1. Annular lunar eclipse doesn't occur.

2. The distance between the Moon and the Earth varies during the Moon's rotation around the Earth.

## [B] Compare between :

Points of comparison	Total solar eclipse	Partial solar eclipse
Cause of occurrence :	.....	.....
Shape of Sun :	.....	.....

## 5. [A] Put (✓) or (X) :

(5 marks)

1. The duration of the solar eclipse may last for more than two hours. ( )
2. It is not harmful to look directly to the Moon during lunar eclipse. ( )
3. Solar eclipse occurs at full moon phase. ( )
4. Annular solar eclipse appears in the antumbra area. ( )

## [B] What is meant by ... ?

1. Lunar eclipse :

2. Annular solar eclipse :



## Unit Four

Total mark  
25

## Worksheet 9

Answer each of the following questions :

## 1. Complete the following statements :

(5 marks)

- ..... follows the epidermis layer, while ..... follows the cortex layer.
- The stomata are widely spread on ..... of the plant leaves, while each stoma is surrounded by .....
- ..... has a big vacuole that contains salt solution.
- The plant loses some of its water through ..... by .....
- Water is transmitted from the soil to the vacuole of the root hair by ..... , while mineral salts are transmitted by .....
- Any plant consists of root system and .....

## 2. Write the scientific term :

(5 marks)

- A system in the plant that extends through the soil particles to absorb water and mineral salts. (.....)
- A structure extends from the epidermis layer of the root and has big vacuoles that contain salt solution. (.....)
- It is a process by which cell membrane of the root hair allows some types of salts to pass according to the plant's need. (.....)
- It is the transmission of water molecules through semi-permeable membrane from an area with high concentration of water to an area of low concentration of water. (.....)
- The last layer in the root that follows the xylem layer. (.....)

## 3. [A] Give reasons for :

(5 marks)

- Presence of holes on the lower surface of the plant leaves.  
.....
- Plants make photosynthesis process.  
.....
- The root system is very important to the plant.  
.....







## Worksheets

2. Respiration process contributes in transmission of water and dissolved salts to the top of the plant. ( )
3. Stomata are widely spread on the upper surface of the plant leaves. ( )

[B] Look at the opposite figures then, answer the questions :

1. These figures show the structure of .....

2. Label the figures.

① .....

② .....

3. Figure (a) represents .....  
while figure (b) represents .....



Fig. (a)

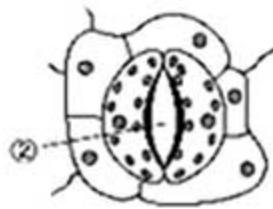


Fig. (b)

ذاكرولى  
RaNia SaYed



## General Exercise of the School Book on

## 1. Choose the correct answer :

- Stomata are widely spread on .....  
a. stem.                      b. upper surface of the leaf.                      c. lower surface of the leaf.
- Root hair absorbs most water by .....  
a. imbibition.                      b. osmosis.                      c. selective permeability.
- Plant loses water in form of water vapour in .....  
a. photosynthesis.                      b. transpiration.                      c. evaporation.

## 2. Write the scientific term of each of the following statements :

- Transmission of water molecules through a semi-permeable membrane from an area with a low concentrated solution to an area with a high concentrated solution. ( ..... )
- A structure extends from root wall which absorbs water. ( ..... )
- Biological process through which plants lose water in the form of vapour. ( ..... )
- A structure in plant, water passes through it from root to stem to leaves. ( ..... )
- Two cells surround the stoma in the plant leaves. ( ..... )
- The ability of the cell membrane of root hair to allow some salts to pass through it according to the plant's need. ( ..... )

## 3. Re-write the following sentences after correcting the underlined words :

- Respiration process contributes in water and dissolved substances transmission to the top of the plant. ( ..... )
- Stem extends and penetrates in the soil to increase the absorption surface. ( ..... )
- Plant loses water in the form of water vapour in photosynthesis. ( ..... )
- Plant stomata are surrounded by two woody cells. ( ..... )



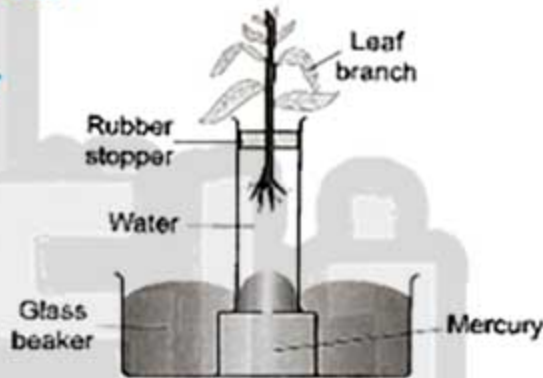
## Worksheets

4. Put (✓) in front of correct statements and (✗) in front of wrong statements in each of the following and correct the wrong ones :

1. Stem extends and penetrates in the soil to increase the absorption surface. ( )
2. Plant loses water in the form of water vapour in photosynthesis. ( )
3. Plant root is surrounded by two guard cells. ( )

5. The following figure represents an experiment you have made during your studies. Which of the following you will notice after several days of experiment start ? .....

- a. Mercury level will reduce.
- b. Mercury level will rise.
- c. Mercury level will remain the same



6. What is meant by ... ?

1. Transpiration.

2. Osmosis.

3. Selective permeability.



## Model Exam

## on Unit Four

Answer each of the following questions :

1. Complete the following statements :

(5 marks)

- The ..... are tiny holes spread on the two surfaces of the plant leaves and other ..... parts.
- ..... process in plants creates a ..... that raises up water and dissolved salts to the plant top.
- Green plants need water, ..... and light to make ..... process.
- ..... absorb water and dissolved salts from the soil, while ..... transports them to the other parts of plant.
- ..... layer regulates the passage of ..... to the wood tissue.

2. [A] Give reasons for :

(5 marks)

- Root hairs can absorb water from the soil.  
.....
- The two guard cells change their shapes from time to time.  
.....

[B] Write the scientific term :

- Losing of excess water in the form of water vapour through stomata which spread on the two surfaces of the leaf. (.....)
- A type of energy that plants need to make their food. (.....)
- A feature that helps water to be transported from soil to the root hairs. (.....)

3. Choose the correct answer :

(5 marks)

- The plant gets the mineral salts from the soil through .....  
 a. transpiration process.                      b. osmosis property.  
 c. selective permeability.                      d. photosynthesis process.
- The concentration of water inside the vacuole of the root hair is ..... the concentration of water in the soil  
 a. higher than      b. lower than      c. equal to      d. (a) or (c)
- The external thin layer of the plant root is called .....  
 a. endodermis.      b. xylem.      c. epidermis.      d. pith.



## Worksheets

4. Stomata are widely spread on .....
- stem.
  - upper surface of the leaf.
  - lower surface of the leaf.
  - root.
5. The root system .....
- is extended through the soil to fix the plant.
  - covers a large area of the soil to search for water and mineral salts.
  - absorbs water and mineral salts.
  - (a) , (b) and (c).

## 4. [A] What happens if... ?

(5 marks)

1. There are no guard cells which surround the stoma.
- .....
- .....

2. There is no osmosis feature in the plant.
- .....
- .....

## [B] Correct the underlined words :

1. Photosynthesis process helps in raising water and mineral salts to the top. ( ..... )
2. Air flows from the soil to the root hairs by osmosis. ( ..... )

## 5. [A] Compare between :

(5 marks)

Points of comparison	Osmosis feature	Transpiration Process
Definition :	.....	.....
	.....	.....
	.....	.....
Takes place in :	.....	.....

## [B] What is the importance of the endodermis layer of the plant root ?

.....

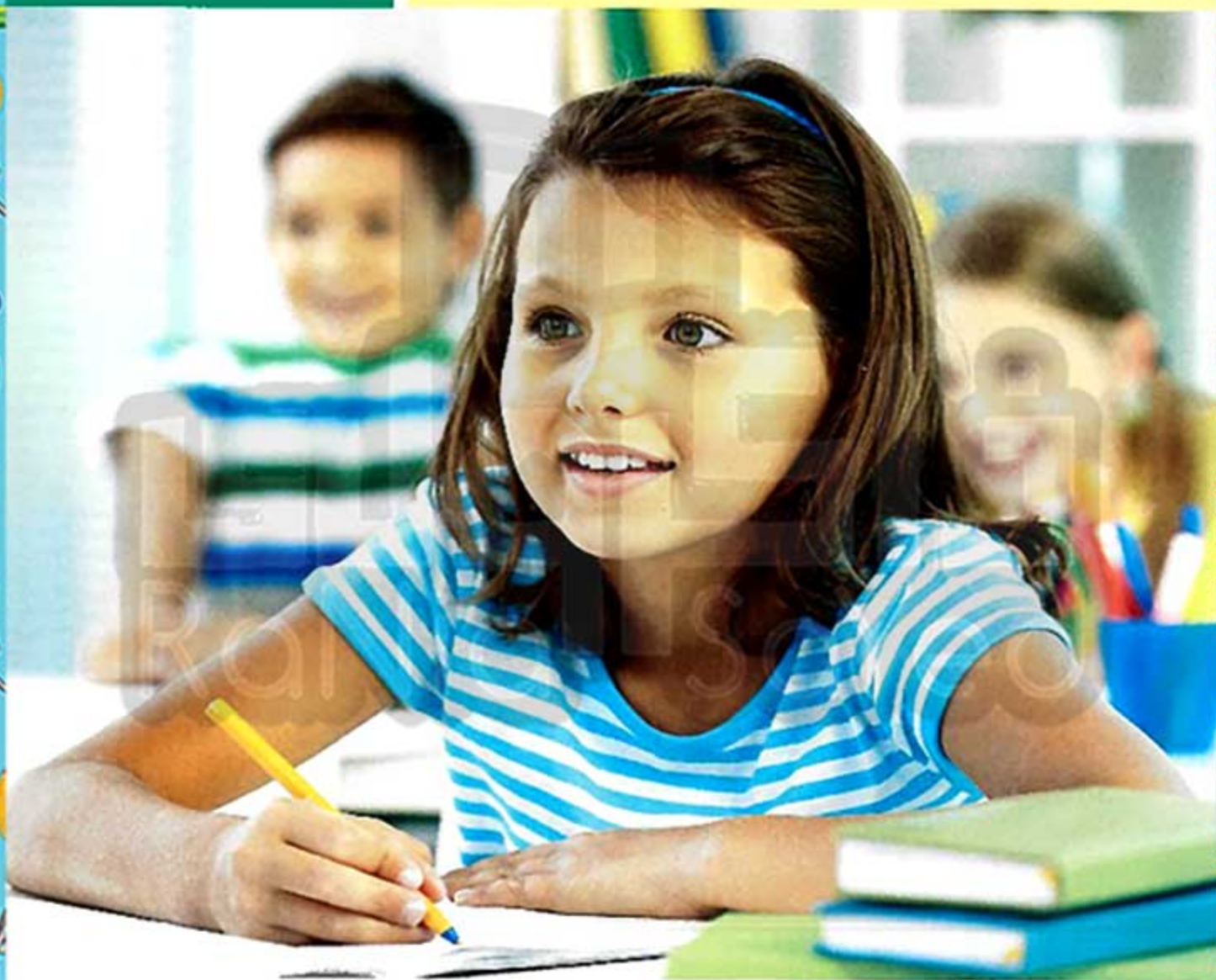
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PART

2

# Final Revision



**Unit One** : Force and motion.

**Unit Two** : Electric energy.

**Unit Three** : The universe.

**Unit Four** : Structure and function of living organisms.

هذا العمل خاص بموقع ذاكرولي التعليمي ولا يسمح بتداوله على مواقع أخرى



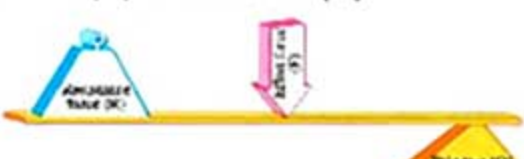


# Final Revision

## on Unit 1



### 1 Definitions

Item	Definition
1. The lever :	It is a rigid bar (straight or curved) that rotates around a fixed point called fulcrum, and is affected by an effort force and a resistance force.
2. A resistance force (R) :	It is a force is resulted from the weight of the body that we want to move.
3. An effort force (F) :	It is a force that is exerted by a person to equilibrate the resistance.
4. Fulcrum (O) :	It is a fixed point, where the bar rotates around.
5. First class levers :	They are levers that have the fulcrum (O) between the effort force (F) and the resistance force (R). 
6. Second class levers :	They are levers that have the resistance force (R) between the effort force (F) and fulcrum (O). 
7. Third class levers :	They are levers that have the effort force (F) between the resistance force (R) and fulcrum (O). 
8. Newton :	It is the measuring unit of resistance and effort force.
9. Effort force arm :	It is the distance between the effort force and fulcrum.
10. Resistance arm :	It is the distance between the resistance force and fulcrum.
11. Metre or centimetre :	They are the measuring units of the length of effort arm and resistance arm.



## 2 Importance

Item	Its importance
1. Levers :	<ul style="list-style-type: none"> <li>- They are used to increase force.</li> <li>- They are used to increase distance.</li> <li>- They are used to increase speed.</li> <li>- They are used to move force from one place to another.</li> <li>- They are used to avoid dangers.</li> <li>- They are used to pick up very small objects.</li> </ul>
2. First class levers :	Some of them conserve effort, but the others don't.
3. Second class levers :	They always conserve effort (have mechanical benefits).
4. Third class levers :	They always don't conserve effort (have no mechanical benefits).

## 3 Give reasons for

### 1. Wheelbarrow and scissors are levers.

Because they consist of a rigid bar that rotates around a fixed point called fulcrum (O), and is affected by an effort force (F) and a resistance force (R).

### 2. • Some levers save effort.

#### • Nutcracker is considered as an increasing force lever.

Because in these levers, we use a small force to make a great effort.

### 3. The manual broom is considered as an increasing distance lever.

Because your hand moves a small distance at the upper part of the broom, while its lower part moves a longer distance.

### 4. Doctors and watch makers use tweezers as a lever.

To pick up very small objects.

### 5. Levers are very important in our daily life.

Because they are used in :

- Increasing force.
- Increasing speed.
- Increasing distance.
- Moving force from one place to another.
- Picking up the very small objects.
- Avoiding dangers.

### 6. Crowbar, water pump, and paddle are first class levers.

Because they have fulcrum between the effort force and the resistance force.



**7. Bottle opener and stapler are second class levers.**

Because they have the resistance force between fulcrum and the effort force.

**8. Hockey bat and fishing tool are third class levers.**

Because they have the effort force between the resistance force and fulcrum.

**9. Wheelbarrow is a second class lever, while sweet holder is a third class lever.**

Because wheelbarrow has the resistance force between effort force and fulcrum, while sweet holder has the effort force between the resistance force and fulcrum.

**10. When the resistance arm is longer than the effort arm, the lever doesn't conserve effort.**

Because the effort force is larger than the resistance force according to the law of levers.

**11. When the length of the force arm and the resistance arm are equal, the lever doesn't conserve effort or has no mechanical benefit.**

Because the effort force equals the resistance force according to the law of levers.

**12. When the force arm is longer than the resistance arm, the lever conserves effort.**

Because the effort force is smaller than the resistance force according to the law of levers.

**13. The crowbar conserves effort.**

Because in crowbar, the effort force is smaller than the resistance force.

**14. The force and resistance can be equal only in the first class levers.**

Because in the first class levers only, the effort arm may be equal to the resistance arm.

**15. Sometimes the 1<sup>st</sup> class levers save effort.**

Because sometimes in the 1<sup>st</sup> class levers, the effort arm is longer than the resistance arm.

**16. The second class levers always conserve effort.**

Because the effort arm is always longer than the resistance arm, so the effort force is always smaller than the resistance force.

**17. The soda water opener saves effort.**

Because it is a second class lever that has the effort force smaller than the resistance force.



**18. The effort force doesn't equal the resistance in the 2<sup>nd</sup> class levers.**

Because in the second class levers, the effort arm is always longer than the resistance arm.

**19. The third class levers always don't conserve effort.**

Because the effort arm is always shorter than the resistance arm, so the effort force is always larger than the resistance force.

**20. Nutcracker and wheelbarrow have a mechanical benefit.**

Because they are second class levers, where the resistance force is larger than the effort force.

**21. In the 2<sup>nd</sup> class levers, the effort force is always less than the resistance force.**

Because in the 2<sup>nd</sup> class levers, the effort force arm is always longer than the resistance arm.

**22. In the stapler, the effort force is smaller than the resistance force.**

Because the effort arm is longer than the resistance arm.

**23. • Some of the levers are important to man although they don't conserve effort.**

• The 3<sup>rd</sup> class levers are very important in our daily life although they don't conserve effort.

Because they are important in other things as :

- Increasing distance.
- Increasing speed.
- Avoid dangers.
- Accuracy in performance.

#### 4 What happens if

**1. We didn't have levers.**

Many tasks can't be performed easily as holding the very hot objects as coal.

**2. The length of the force arm and the resistance arm are equal.**

The effort force and the resistance force are equal and this lever doesn't conserve effort.

**3. The force arm is longer than the resistance arm.**

The effort force is smaller than the resistance force and this lever conserves effort.

**4. The resistance force is equal to the effort force.**

The lever doesn't conserve effort.



## Final Revision

**5. The resistance arm is longer than the force arm.**

The effort force is larger than the resistance force and the lever doesn't conserve effort.

**6. The resistance force is larger than the effort force.**

The lever saves effort.

**7. The effort force is larger than the resistance force.**

The lever doesn't conserve effort.

**8. Both of effort force arm and resistance arm equal 7 metres.**

The effort force is equal to the resistance force.

**9. The length of the force arm is half the length of the resistance arm for a lever.**

The effort force is double the resistance force and this lever doesn't conserve effort.

**5 Important law**

The law of levers states that :

The effort force  $\times$  Its arm = The resistance force  $\times$  Its arm

**6 Important Problems**

- 1** A force that its value equals 50 Newton affects a lever of the 2<sup>nd</sup> class , that its force arm = 20 cm. Calculate the resistance force , where its resistance arm = 5 cm.

**Answer :**

Effort force  $\times$  its arm = Resistance force  $\times$  its arm

$$50 \times 20 = \text{Resistance} \times 5$$

$$\text{Resistance} = \frac{50 \times 20}{5} = 200 \text{ Newton.}$$

- 2** In the following figures , determine by drawing the position where only one weight (equals 1 N) is placed to regain the balance of the lever.  
(keeping in your mind that the distance between every two openings is 1 cm).

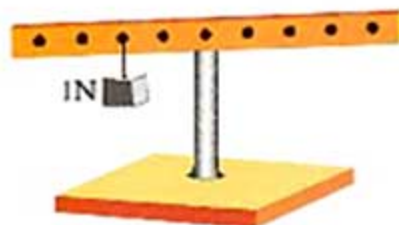


Fig. (a)

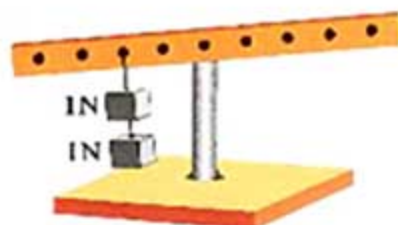


Fig. (b)



**Answer :**

- By applying the law of levers that states :  
" Effort force  $\times$  its arm = Resistance force  $\times$  its arm".

• The resistance force = 1 Newton.	• The resistance force = 2 Newton.
• The effort force (the weight that we will put) = 1 Newton.	• The effort force (the weight that we will put) = 1 Newton.
• Arm of resistance = 2 cm.	• Arm of resistance = 2 cm.
• $1 \times \text{arm of force} = 1 \times 2$	• $1 \times \text{arm of force} = 2 \times 2$
• Arm of force = 2 cm.	• Arm of force = 4 cm.

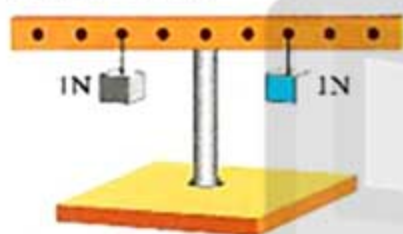


Fig. (a)

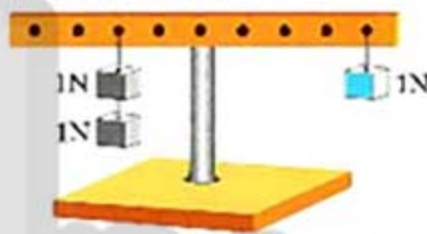


Fig. (b)

- 3** The length of the force arm of a crowbar is 100 cm. and the length of the resistance arm is 15 cm. If the value of resistance force equals 400 Newton , calculate the value of the effort force and mention the type of the lever and its conservation of effort.

**Answer :**

- Effort force  $\times$  its arm = Resistance force  $\times$  its arm  
Effort force  $\times$  100 = 400  $\times$  15  
Effort force =  $\frac{400 \times 15}{100} = 60$  Newton.
- The lever is a first class lever.
- This lever conserves effort.

- 4** A third class lever , where the effort force = 200 Newton , the force arm = 5 cm. and the resistance force = 100 Newton. Calculate the length of the resistance arm.

**Answer :**

$$\begin{aligned} \text{Effort force} \times \text{its arm} &= \text{Resistance force} \times \text{its arm.} \\ 200 \times 5 &= 100 \times \text{its arm} \\ \text{Resistance arm} &= \frac{200 \times 5}{100} = 10 \text{ cm.} \end{aligned}$$



## Final Revision

## 7 Comparison

Between the three types of levers.

Points of comparison	First class levers	Second class levers	Third class levers
- Definition :	They are levers that have fulcrum between the resistance force and effort force.	They are levers that have the resistance force between the fulcrum and effort force.	They are levers that have the effort force between the fulcrum and resistance force.
- The location of F,O,R :	The fulcrum (O) is between effort force (F) and resistance force (R).	The resistance force (R) is between fulcrum (O) and effort force (F).	The effort force (F) is between resistance force (R) and fulcrum (O).
- Effort force arm and resistance arm :	The effort force arm may be longer than, shorter than or equal to the resistance arm.	The force arm is always longer than the resistance arm.	The resistance arm is always longer than the force arm.
- Saving effort :	Some of them save effort, but the others don't.	Save effort.	Don't save effort.
- Examples :	Seesaw, scissors, crowbar, pliers and water pump.	Nutcracker, wheelbarrow and bottle opener.	Tweezers, hockey bat, ice holder and manual broom.
- Benefits :	Some of them have a mechanical benefit, but the others have other benefits as increasing speed, increasing distance, avoid dangers and accuracy in performance.	All of them have a mechanical benefit as they save effort.	<ul style="list-style-type: none"> <li>- They are used to increase speed and distance.</li> <li>- They are used to avoid dangers.</li> </ul>



## 8

## Main Points

1. The most common simple machines are levers that were described in 260 B.C by the **Greek scientist Archimedes**.
2. Any **lever** consists of :
  - A resistance force (R)
  - An effort force (F)
  - Fulcrum (O)
3. First class levers are the **most popular type** of levers in our daily life.
4. Each of scissors, pliers, pincers and nail clippers are composed of **two first class levers**.
5. Nutcracker is composed of **two second class levers**.
6. Tweezers is composed of **two third class levers**.
7. **Steps to determine the type of lever :**
  - Determine the position of effort force, resistance force and fulcrum.
  - Identify the mid point of the lever.
  - Determine the type of lever as in the following table :

The mid point:	The fulcrum (O)	The resistance force (R)	The effort force (F)
Type of lever :	First class lever.	Second class lever.	Third class lever.



# Final Revision

## on Unit 2



### 1 Definitions

Item	Definition
1. Electric lamps :	They are tools that convert electric energy into light energy.
2. The filament of the lamp :	It is a coiled thin wire that made of tungsten.
3. Electric circuit :	It is a closed and continuous path through which, the electric current will pass making a complete cycle.
4. Series connection :	It is a way in which the light bulbs are connected one after another in one route.
5. Parallel connection :	It is a way in which the light bulbs are connected in branching routes.
6. Electric conductors :	They are materials that allow the flow of electricity through them.
7. Electric insulators :	They are materials that don't allow the flow of electricity through them.
8. Electric fires :	They are fires that occur as a result of the increase in the temperature of the electric machines.
9. Electric shock :	It is one of the danger of electricity that occurs due to passing the electric current through the human body.
10. Electric burns :	They are burns that result from electricity and cause the damage of the body tissues.

### 2 Functions or uses

Item	Functions or uses
1. Light bulbs :	They are the most popular source of artificial light, where they are used in many purposes such as lighting houses, car lights and torches.
2. The filament :	It heats up and emits light when the electric current passes through it.
3. Copper and lead wires in light bulb :	They allow the electric current to pass from the base of the light bulb to the tungsten filament.
4. Glass bulb of the light bulb :	It prevents air from reaching the filament to protect it from burning.



5. Inert argon gas :	It protects the filament from burning and increases the lifetime of the filament.
6. The base of the light bulb :	<ul style="list-style-type: none"> <li>- It carries the light bulb in upright position.</li> <li>- It connects the light bulb to the electric circuit.</li> </ul>
7. Fluorescent lamps :	They are used in many purposes such as : <ul style="list-style-type: none"> <li>• Lighting houses, and offices.</li> <li>• Decorating commercial stores.</li> <li>• Commercial advertisements.</li> </ul>
8. Points of connection in fluorescent lamp :	They connect the fluorescent lamp to the electricity.
9. Battery :	It works as a source of electric current in the electric circuit.
10. Electric wires :	They are used to connect the battery with the lamp in the electric circuit.
11. Electricity :	It is used to : <ul style="list-style-type: none"> <li>• Cook food and preserve it cold.</li> <li>• Light our houses, factories, streets, ...</li> <li>• Operate some machines such as radios, televisions, washing machines, toys, ...</li> </ul>
12. Sand :	It is used in putting out electric fires.

### 3 Give reasons for

- The filament of the light bulb is made of tungsten.**  
Because it has high melting point that prevents the melting of the filament at high temperatures.
- The glass bulb in the light bulb is filled with inert argon gas instead of air.**  
To protect the filament from burning so the lifetime of the filament increases.
- The filament of the electric lamp is the most important part in the light bulb.**  
Because it heats up and emits light when the electric current passes through it.
- There are pieces of lead in the base of the light bulb.**  
To connect the lamp to the electric circuit.
- Copper and lead wires are connected to the filament from one end and connected with the base of the bulb from the other end.**  
To transfer the electric current from the base of the lamp to the tungsten filament.



**6. The fluorescent lamps are very important in our life.**

Because they are used in many purposes as :

- Lighting houses, offices.
- Decorating commercial stores.
- Commercial advertisements.

**7. The glass tube of the fluorescent lamp is filled with argon gas.**

To protect the two filaments of tungsten from burning and to increase their lifetime.

**8. There are two points of connection at each tip of the fluorescent lamp.**

To connect the fluorescent lamp to the electricity.

**9. The light bulbs are connected in the house in parallel.**

To prevent turning off all the lamps of the house when one lamp is damaged or turned off.

**10. In the decorative lights, if one or more lamps burn out, the other lamps don't turn off.**

Because the lamps of the decorative lights are connected in parallel.

**11. Decorative lamps are connected in parallel not in series.**

To prevent turning off all the lamps when one or more lamps burn out.

**12. Electric energy is very necessary in our daily life.**

Because we use it :

- To cook food and preserve it cold.
- To light our houses, factories, ... etc.
- In operating some machines as washing machines, radios and televisions.

**13. The electric wires are made of copper.**

Because copper is a good conductor of electricity.

**14. The electric cables (wires) are covered by insulating materials.**

To avoid occurrence of electric shock when touching the electric cables (wires).

**15. Aluminium is an electric conductor.**

Because it allows electric current to pass through it.

**16. Plastic is considered as an electric insulator.**

Because it doesn't allow electric current to pass through it.



17. • **Not placing flammable materials close to the electric machines that generate heat.**  
• **The electric heater must not be placed close to furniture or rugs.**  
To avoid occurrence of electric fires.
18. **Plugging more than one machine to one socket causes electric fires.**  
Because it causes electric overload that heats up wires leading to electric fires.
19. **We must disconnect the electric current from the electric machines that generate heat after use.**  
Because this causes an increase in the temperature of these machines that leads to electric fires.
20. **Water is not used to put out electric fires.**  
Because water is a good conductor of electricity, so it increases fires and could harm the rescuers.
21. **If we insert an iron nail in a simple electric circuit, the electric current will pass through it.**  
Because iron is an electric conductor Which allow electricity to pass through it.
22. **If we insert a piece of wood in a simple electric circuit, the electric current will not pass through it.**  
Because wood is an electric insulator Which does not allow electricity to pass through it.
23. **Don't place any metallic object in the socket.**  
To avoid occurrence of electric shock.
24. **Placing a piece of plastic in the socket.**  
To prevent inserting another body in it.
25. **Pushing the injured by anything that is non-conducting of electricity such as a piece of wood.**  
Because the electric insulating material such as wood will prevent the transfer of electricity from the injured person to your body.
26. **We must not touch any electric machine with wet hand.**  
To avoid occurrence of electric shock as water is a good conductor of electricity.
27. **Avoid fixing or cleaning any electric machine, while it is connected to the electric source.**  
To avoid occurrence of electric shock.



## 4 What happens if

1. **There is no glass bulb around the parts of the electric lamp.**  
The air will reach the filament causing its burning when it heats up.
2. • **The glass bulb in the electric lamp is filled with oxygen.**  
• **The electric lamps contain atmospheric air.**  
The filament will burn when it heats up.
3. **You make the filament of the light bulb from iron.**  
The filament will melt at the high temperatures.
4. **The tungsten filament in the light bulb is cut.**  
The light bulb will not emit light.
5. **The two metallic pieces are not found in the base of the light bulb.**  
The light bulb can't be connected to the electricity.
6. **There is no battery in the electric circuit.**  
There is no electric current in this electric circuit as the battery is the main source of the electric current.
7. **Opening the electric circuit by using the electric switch.**  
The electric current does not pass through the electric circuit.
8. **Many light bulbs are connected in series in an electric circuit.**  
The light intensity of the lamps will decrease by increasing the number of the connected light bulbs.
9. **Many light bulbs are connected in parallel in an electric circuit.**  
The light intensity of the lamps will not be affected by increasing the number of the connected light bulbs.
10. **Turning off (burning out) one light bulb in an electric circuit that contains many lamps connected in series.**  
The other lamps in the electric circuit will be turned off.
11. **One of the electric lamps burns out, while it is connected in parallel with the others.**  
The other lamps in the electric circuit will not be affected and keep lighting.
12. **The light bulbs in the house are connected in series.**  
When one of the lamps damaged or turned off, all the other lamps in the house will turn off.



13. The electric current passes through the tungsten filament in the light bulb.  
The tungsten filament heats up and emits light.
14. You place the electric heater close to furniture or carpets.  
When the temperature of the heater increases, it may burn the furniture or carpets causing fires.
15. Plugging several electric machines in the same simple electric socket.  
It causes electric overload, so the wires heat up causing electric fires.
16. A piece of copper is inserted in a closed simple electric circuit.  
The electric current will flow through the circuit as copper is a good conductor of electricity.
17. A piece of glass is inserted in a closed simple electric circuit.  
The electric current doesn't flow through the electric circuit, because glass is a bad conductor of electricity.
18. • You insert a metallic bar in an electric socket.  
• You try to fix or clean an electric machine, while it is switched on.  
• You touch a plugged electric machine with wet hand.  
• A man touches an uncovered wire that has an electric current.  
This causes an electric shock.
19. The electric fires are put out by water.  
The fire will increase and could harm the rescuers as water is a good conductor of electricity.
20. Touching a naked wire, while touching the ground.  
This cause an electric shock.
21. The spark resulting from the electric fires touches any part of your body.  
This may cause electric burns for you.
22. A part of your body touches an electric iron connected with electricity.  
This part of your body will expose to electric burn.
23. The electric wires are left uncovered and non insulated.  
This causes an electric shock when touching the uncovered wires.
24. Electricity is not handled cautiously.  
Electricity may cause many dangers as electric fires, electric burns and electric shock.



## 5 Comparisons

### 1. Comparison between series connection and parallel connection of lamps :

Points of comparison	Series connection	Parallel connection
1. Definition :	It is a way of connection, in which the light bulbs are connected one after another in one route.	It is a way of connection, in which the light bulbs are connected in branching routes.
2. Light intensity :	Decreases by increasing the number of lamps.	Remains constant by increasing or decreasing the number of lamps.
3. The route of electricity :	There is one route only for the electric current to pass through the electric circuit.	There are more than one route for the electric current to pass through the electric circuit.
4. The effect of burning out or unscrewing any of the lamps :	The other lamps are turned off.	The other lamps are lighted up with the same intensity.

### 2. Comparison between electric conductors and electric insulators :

Points of comparison	Electric conductors	Electric insulators
1. Definition :	They are materials that allow the flow of electricity through them.	They are materials that do not allow the flow of electricity through them.
2. Examples :	Iron, copper and aluminium.	Wood, plastic and clothes.
3. Connection with the electric circuit :	Make the circuit closed.	Make the circuit open.



## 6 Activities



## Activity 1

To show how to connect light bulbs in series.



## Steps:

1. Form an electric circuit as shown in fig. (a)
2. Connect another light bulb to the circuit as shown in fig. (b)
3. Repeat the previous step by connecting four light bulbs as shown in fig. (c)
4. Unscrew one lamp from the electric circuit, while the others are still connected as shown in fig. (d)



Fig. (a)

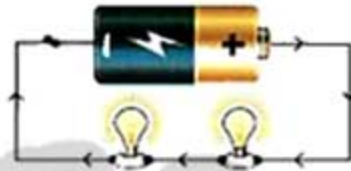


Fig. (b)



Fig. (c)



Fig. (d)



## Observations:

- The light intensity of the bulb is strong.
- The light intensity of the two light bulbs decreases.
- The light intensity of the four light bulbs becomes very weak.
- The other three light bulbs are turned off.



## Conclusion :

## In series connection :

- By increasing the number of the connected light bulbs, the lighting (light intensity) of the bulbs decreases and vice versa.
- There is one route for the electric current to pass through the circuit.





## Activity 2

To show how to connect light bulbs in parallel.



### Steps:

1. Connect two light bulbs in an electric circuit as shown in fig. (a)
2. Connect four light bulbs in an electric circuit as shown in fig. (b)
3. Unscrew one of the bulbs, while the others are connected as shown in fig. (c)

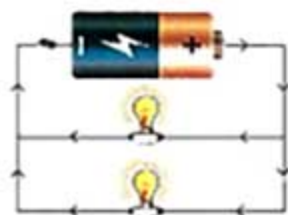


Fig. (a)

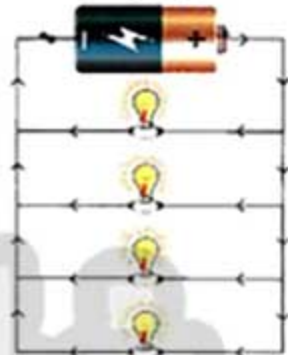


Fig. (b)

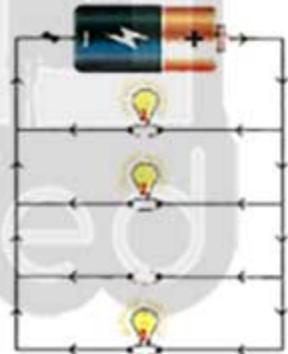


Fig. (c)



### Observations:

The light intensity of the two bulbs is strong.

The light intensity of the four bulbs is similar to the light intensity of the two bulbs in the previous step.

The unscrewed electric bulb is turned off, while the other three bulbs are lighted up with the same light intensity.



### Conclusion :

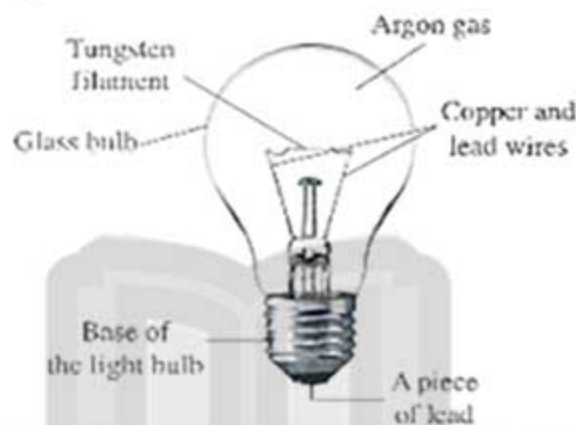
**In parallel connection :**

- By increasing the number of the connected light bulbs, the lighting (light intensity) of the bulbs remains as it is.
- There are branching routes for the electric current to pass through the circuit.



## 7 Important drawings

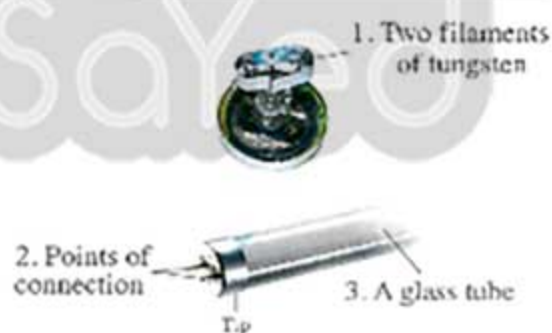
## - The structure of the light bulb.



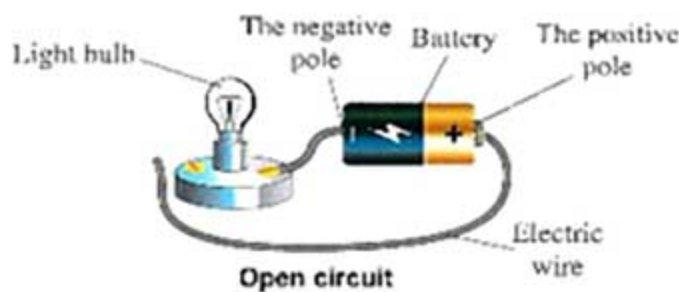
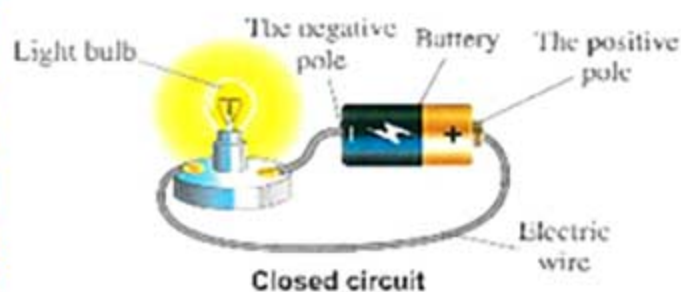
## - Types of bases of the light bulb.



## - The structure of the fluorescent lamp.



## - Closed electric circuit and open electric circuit.





## 8 Main Points

1. The **Sun** is the main source of light on the Earth's surface.
2. Electric lamps are constant source of light that is **clean, bright** and **free from smoke, vapour** and **odor**.
3. **Thomas Alpha Edison** is an American inventor that invented the **light bulb**.
4. The most popular types of lamps are **light bulbs** and **fluorescent lamps**.
5. The light bulb consists of three main parts which are :
  - a. The filament.
  - b. The glass bulb.
  - c. The base of the light bulb.
6. The filament of the light bulb is made of **tungsten**.
7. Inert gases are inactive gases **as they don't burn and don't help in burning**, so we use them in the electric lamps to protect the filament from burning.
8. There are two types of the bases of the light bulb which are :
  - a. Spiral base.
  - b. Two side nails base.
9. The fluorescent lamp consists of three main parts which are :
  - a. The glass tube.
  - b. Two filaments of tungsten.
  - c. Points of connection.
10. The inner surface of the glass tube in the fluorescent lamp is covered with a **phosphoric material**.
11. The fluorescent lamp is known as **neon lamp**, but inert neon gas is not used inside its glass tube.
12. The simple electric circuit consists of :
  - a. Battery.
  - b. Lamp.
  - c. Electric wires.
13. The electric current passes through the **closed electric circuit**, but it doesn't pass through the **open electric circuit**.
14. Methods of connection of electric lamps in the electric circuits are :
  - a. Series connection.
  - b. Parallel connection.



15. All lamps and machines in the house are connected in **parallel**.
16. Materials are divided into two types according to their conductivity of electricity which are **electric conductors** and **electric insulators**.
17. All metals are electric conductors such as **iron, copper** and **aluminium**.
18. The human body is a **good conductor of electricity**, because 70% of the body contains water.
19. The electric wires are made of **copper** which is an electric conducting material.
20. The electric wires are covered with **plastic** which is an electric insulating material to avoid dangers of electricity when dealing with electric wires.
21. Dangers resulted from the improper use of electricity are **direct injuries** and **indirect injuries**.
22. Direct injuries includes **electric fires, electric shock** and **electric burns**.
23. **Indirect injuries** like injuries that result from falling from the top of a ladder.
24. **The reasons of the electric fires include :**
  - a. Placing an electric machine that generates heat close to some flammable materials.
  - b. Plugging more than one machine to one socket.
  - c. Not disconnecting the electric current from the electric machine that generates heat after using it.
25. **Water** can be used to put out **regular fires**, but **sand** is used to put out **electric fires**.
26. **The harms resulting from an electric shock depend on :**
  - a. The strength of the electric current to pass through the human body.
  - b. The time took by the electric current to pass through the human body.
27. **The reasons of the electric shock :**
  - a. When a part of your body touches a wire that has an electric current and the other part touches the ground.
  - b. When a part of your body touches a wire that has an electric current, but the other part touches a material conducting electricity and connected to the ground.
  - c. When you touch two wires conducting with electricity.



**28. The reasons of the electric burns :**

- a. When a part of your body touches a source of electric current directly.
- b. When a part of your body touches fire or spark resulting from an electric fire.
- c. When a part of your body touches an electric machine that generates heat.

**29. Precautions in dealing with electricity :**

- a. Do not play with the electric connections.
- b. Do not insert a metallic object in the socket.
- c. Do not touch the electric machines that are connected to the electric current with wet hand.
- d. Do not try to fix or clean any electric machine, while connected to the electric current.
- e. Do not place the electric wires extending on the ground, as anyone can trip on them, while walking.
- f. Do not leave the wires naked and not insulated.
- g. Do not place several connections in the same socket.
- h. Do not leave an electric machine connected with the electric current, while taking a bath.
- i. Place a piece of plastic in the socket to prevent inserting another body in it.
- j. Do not place flammable materials close to the electric machines that generate heat as iron, heater, .....



# Final Revision

## on Unit 3



### 1 Definitions

Item	Definition
1. The solar eclipse phenomenon :	It is the astronomical phenomenon which occurs when the Earth, the Moon and the Sun are nearly on one straight line with the Moon in the middle.
2. The cone umbra (umbra) :	It is the dark inner shadow area in which the total solar eclipse appears.
3. The penumbra :	It is the faint outer shadow area in which the partial solar eclipse appears.
4. Total solar eclipse :	It is the type of solar eclipse in which we can't see the Sun completely and it is formed in the shadow area (umbra) of the Moon.
5. Partial solar eclipse :	It is the type of solar eclipse in which we can see part of the Sun and it is formed in the semi-shadow area (penumbra) of the Moon.
6. Annular solar eclipse :	It is the type of solar eclipse in which the Sun appears as a lighted ring and it is formed when the Moon is in a higher orbit from the Earth.
7. Lunar eclipse :	It is the astronomical phenomenon which occurs when Sun, Earth and the Moon are nearly on one straight line with the Earth in the middle, hiding the sunlight from the Moon.
8. Total lunar eclipse :	It is the lunar eclipse which occurs when the whole Moon enters the shadow area (umbra) of the Earth.
9. Partial lunar eclipse :	It is the lunar eclipse which occurs when part of the Moon enters the shadow area (umbra) of the Earth.

### 2 Give reasons for

#### 1. Occurrence of the solar eclipse.

Because the Earth, the Moon and the Sun are nearly on one straight line with the Moon in the middle.

#### 2. The Moon blocks sunlight from reaching the Earth when it comes between the Sun and the Earth.

Because the Moon is a dark body that doesn't allow the sunlight to pass through.



3. **The distance between the Moon and the Earth varies during the Moon's rotation around the Earth.**  
Because the Moon rotates around the Earth in an oval shape orbit.
4. **The type of the solar eclipse differs according to the movement of the Moon in front of the Sun.**  
Due to the difference in the part of the Sun that the Moon hides during its passage in front of the Sun.
5. **The total solar eclipse is formed when the Moon rotates nearer to the Earth.**  
Because when the Moon rotates nearer to the Earth, its size appears equal to the Sun so, it hides all the sunlight.
6. **The annular solar eclipse occurs when the Moon comes in an orbit higher than Earth.**  
Because the Moon's size appears smaller than that of the Sun so, the Sun appears as a lighted ring.
7. **The total solar eclipse appears at umbra.**  
Because the umbra is the dark inner shadow area of the Moon in which no sunlight appears.
8. **The partial solar eclipse appears at penumbra.**  
Because the penumbra is the faint outer shadow area of the Moon in which part of the sunlight is hidden.
9. **We see the Sun as lighting ring when annular solar eclipse is formed.**  
Because annular solar eclipse is formed when the Moon is in a higher orbit from Earth so its cone shadow doesn't reach the Earth and the Sun appears as a lighted ring.
10. • **We shouldn't look directly at the Sun with naked eye during the solar eclipse.**  
• **Doctors warn from the direct observation of the Sun during solar eclipse.**  
Because the Sun emits harmful rays to the eye such as ultraviolet rays (UV) and infrared rays that may cause blindness within few seconds.
11. **Special glasses must be used to look at the solar eclipse.**  
To protect our eyes from ultraviolet and infrared rays coming from the Sun that may cause blindness within few seconds.



12. **Although the weak glowing of the Sun during the eclipse we must not look at it.**  
Because the corona of the Sun keeps emitting its harmful rays such as ultraviolet and infrared rays.
13. **We can't see the Sun completely during the total solar eclipse.**  
Because the Moon hides all the sunlight from the Earth as the Moon's size appears equal to that of the Sun.
14. **During the lunar eclipse, the Earth comes between the Sun and the Moon.**  
To hide all the sunlight or part of it from reaching the Moon.
15. **The lunar eclipse occurs in the middle of the lunar month (full moon phase).**  
Because in the middle of the lunar month, the Earth lies between the Sun and the Moon.
16. **The lunar eclipse doesn't require precautions or special devices to observe it.**  
Because it doesn't harm the eye during observing it.
17. **The Earth has an important role in lunar eclipse.**  
Because when it comes between the Sun and Moon, it casts its shadow on the Moon causing the lunar eclipse.
18. **The umbra of the Earth causes two types of lunar eclipse.**  
Because when part of the Moon enters the umbra region of the Earth, it causes partial lunar eclipse, while when the whole Moon enters the umbra region of the Earth, it causes total lunar eclipse.
19. **The Moon is coloured in red at the start of the total lunar eclipse.**  
Due to the refraction of some infrared rays that are not absorbed by the Earth's atmosphere.
20. **No annular lunar eclipse is formed like the annular solar eclipse.**  
Because the Earth has a great size relative to the Moon, so it always blocks all sunlight when it comes between the Sun and the Moon on the same straight line.
21. **Lunar eclipse can be seen easily from the Earth's surface.**  
Because the lunar eclipse may last for one or two hours and doesn't require precautions or special devices to observe it.
22. **The effect of the lunar eclipse on eye differs from that of the solar eclipse.**  
Because the lunar eclipse doesn't cause any harm to the eye, but the solar eclipse causes serious harms to the eye as blindness.



23. The phenomena of solar and lunar eclipses are considered applications of the umbra phenomenon.

Because sunlight passes in straight lines and if a dark object like the Moon in solar eclipse or Earth in lunar eclipse obstruct it, a shadow (umbra) is formed.

24. The two phenomena of lunar and solar eclipses are repeated regularly and can be predicted.

Because they occur as a result of the Earth and the Moon rotation which can be calculated by scientists.

### 3 What happens when

1. An object is put between a light source and a screen.

It casts its shadow on the screen.

2. The Earth, the Moon and the Sun are nearly on one straight line with the Moon is in the middle.

The solar eclipse occurs.

3. The solar eclipse is watched from umbra region.

It appears as total solar eclipse.

4. The solar eclipse is watched from penumbra region.

It appears as a partial solar eclipse.

5. The solar eclipse is watched from the antumbra region.

It appears as an annular solar eclipse, where the Sun appears as a lighted ring.

6. The size of Moon appears smaller than that of the Sun during the solar eclipse.

The solar eclipse appears as annular solar eclipse.

7. The Moon lies in a higher orbit than Earth.

Annular solar eclipse occurs.

8. The Moon hides a part of the Sun from the Earth's surface.

A partial solar eclipse occurs.

9. The Moon cone shadow does not reach the Earth.

The Earth lies in the antumbra area of the Moon forming annular solar eclipse.

10. • You focus your eyes to the Sun directly during the solar eclipse.

• Someone looks to the Sun directly with naked eye for a long time to observe solar eclipse.

The eye retina will be harmed and blindness may occur.



11. You use a special glasses during observing the solar eclipse.  
We can watch the solar eclipse safely.
12. The Earth comes between the Sun and the Moon on one straight line.  
The lunar eclipse occurs.
13. The Earth blocks the sunlight from reaching the whole Moon.  
Total lunar eclipse occurs.
14. The whole Moon enters the semi-shaded area of Earth.  
The Moon light turns to be faint without being eclipsed which is known as lunar non-eclipse.
15. The whole Moon enters the Earth's umbra.  
Total lunar eclipse occurs.
16. A part of the Moon enters the shadow area of the Earth.  
Partial lunar eclipse occurs.
17. Someone looks at the lunar eclipse with the naked eye.  
There is no harm occurs to his eye, because lunar eclipse doesn't require precautions or special devices to observe it.

## 4 Comparisons

### 1. Between total, partial and annular solar eclipses :

Points of comparison	Total solar eclipse	Partial solar eclipse	Annular solar eclipse
1. Shape of the Sun :	- It disappears completely.	- We can see part of the Sun.	- Sun appears as a lighted ring.
2. Position of the Moon :	- Nearer to the Earth.	- Nearer to or farther from Earth.	- Farther (in a higher orbit) from Earth.
3. Shadow area that is casted on Earth :	- Umbra.	- Penumbra.	- Antumbra.

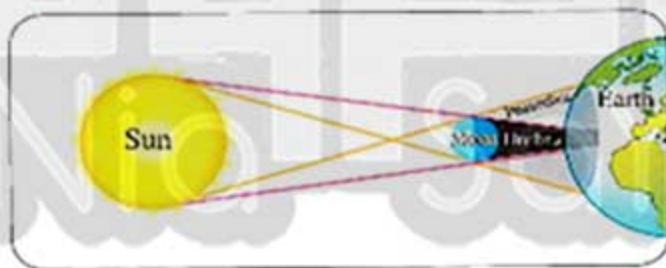


## 2. Between solar eclipse and lunar eclipse :

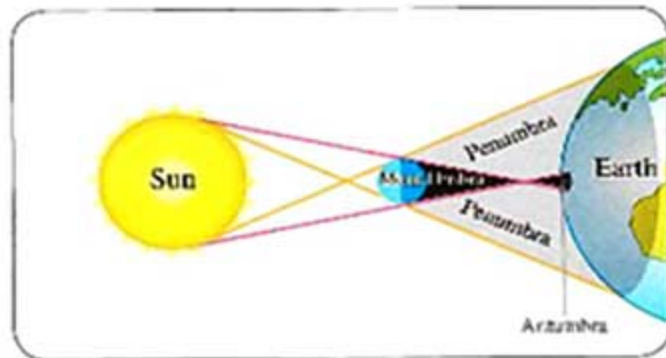
Points of comparison	Solar eclipse	Lunar eclipse
1. How does it occur ?	It occurs when the Moon comes between the Earth and the Sun on one straight line.	It occurs when the Earth comes between the Moon and the Sun on one straight line.
2. Time of occurrence :	It seen at morning only.	It seen at night only (when the Sun is behind the horizon).
3. Its duration :	Its duration doesn't exceed seven minutes and few seconds.	Its duration may last for more than two hours.
4. Safety precautions :	It requires precautions, warnings and special devices to observe it, because it causes serious harms to the eye.	It doesn't require precautions, warnings or special devices to observe it, because it doesn't cause any harm to eye.

## 5 Important drawings

## 1. Types of solar eclipse :



a. Total and partial solar eclipse



b. Annular solar eclipse

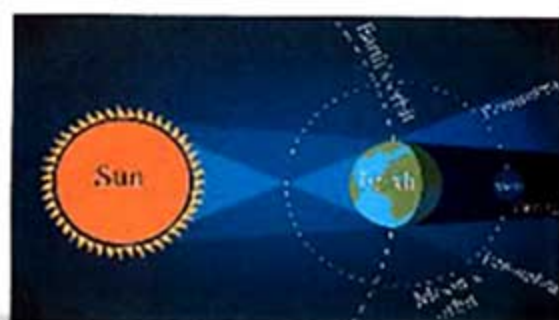


## 2. Types of lunar eclipse :

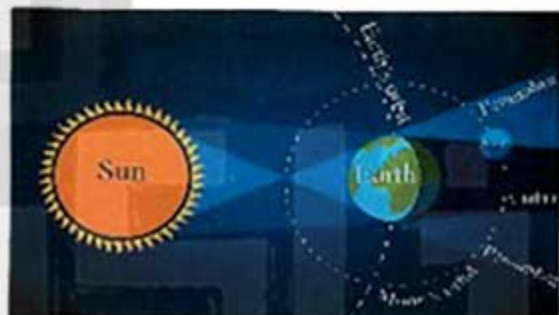
## a. Total lunar eclipse.



Moon red in colour



## b. Partial lunar eclipse.



## 6 Main points

- Although the solar eclipse phenomenon doesn't last for more than **seven minutes and forty seconds**, we can observe more than one type of solar eclipse.
- The phenomenon of lunar eclipse occurs in the **middle of the lunar month** (the Moon phase is **full moon**) with the rate of **two lunar eclipses** per year.
- The lunar eclipse lasts for **one hour or two hours** and the Moon gets coloured with **red** during the beginning of the total lunar eclipse.
- When the **whole** Moon enters the **semi-shaded area** (penumbra) of the Earth, the Moon light turns to be faint without being eclipsed and this phenomenon is known as **lunar non-eclipse**.
- The similarities between the solar and the lunar eclipses :
  1. Each of them is an astronomical phenomenon caused by blocking of sunlight and casting the middle body shadow on the other celestial body so, they don't affect the life on Earth's surface.



## Final Revision

2. Their types occur (repeated) in regular periods of time and can be predicted.
  3. The shadow of both Moon (in solar eclipse) and Earth (in lunar eclipse) is classified into **umbra** and **penumbra**.
- To observe the solar eclipse safely, we should wear **special glasses** to protect the eye retina from ultraviolet and infrared rays that may cause blindness.





# Final Revision

## on Unit 4



### 1 Definitions

Item	Definition
1. Photosynthesis process :	It is a biological process through which green plants get their food from raw materials in their environment.
2. Root hair :	A structure extends from the cells of the epidermis layer of the root.
3. Osmosis feature :	It is the transmission of water molecules through semi-permeable membrane from an area with high concentration of water to an area of low concentration of water.
4. Transpiration process :	It is a vital process by which the plant loses excess water in the form of water vapour through stomata which spread on the two surfaces of the leaf and other green parts to the surrounding environment of the plant.
5. Stomata :	They are tiny holes spread on the two surfaces of the plant leaves and other green parts through which the plant gets rid of excess water.
6. Selective permeability :	It is a process by which the cell membrane of the root hair allows some types of salts to pass according to the plant's need.

### 2 Functions and importance

Item	Functions and importance
1. Root system :	<ul style="list-style-type: none"> <li>- It fixes the plant in the soil.</li> <li>- It absorbs water and mineral salts from the soil.</li> </ul>
2. Root hairs :	They absorb water and mineral salts from the soil.
3. Endodermis layer of the plant root :	It regulates the passage of water to the xylem (wood tissue).
4. Xylem (wood tissue) :	It allows water and mineral salts to pass from root to stem, then to leaves.



## Final Revision

5. Transpiration process :	<ul style="list-style-type: none"> <li>- It helps the plant to get rid of excess water.</li> <li>- It creates a pulling force inside the plant that helps in rising water upwards to the plant top.</li> </ul>
6. Stomata :	They allow the plant to get rid of excess water through transpiration process.
7. Two guard cells :	They control opening and closing the stoma by changing their shapes.

### 3 Give reasons for

- Green plants need some raw materials in the presence of light.**  
To make their food by photosynthesis process.
- Plants make photosynthesis process.**  
To make their own food.
- The plant root is branched and extended through the soil particles.**
  - To fix the plant in the soil.
  - To absorb water and mineral salts from the soil.
- Root hairs can absorb water from the soil.**  
Due to the osmosis feature that takes place through the semi-permeable membrane of the root hairs.
- The concentration of solution inside the root hair vacuole is higher than the concentration of soil solution.**  
Because the solution inside the vacuole of the root hair contains less water and more salt than the soil solution.
- Presence of holes (stoma) in the lower surface of the plant leaves.**  
To get rid of excess water of the plant through transpiration process.
- Water flows from the soil to the root hairs.**  
Due to the osmosis feature, where the concentration of salt in the root hairs is higher than the concentration of salt in the soil.
- Each stoma is surrounded by two guard cells.**  
To control opening and closing the stoma.
- The two guard cells change their shapes from time to time.**  
To open and close the stoma.



## 4 What happens if

1. A plant is kept in dark for a long period of time.

The plant cannot make photosynthesis process due to the absence of light.

2. Root system is not extended in the soil particles.

The plant cannot be fixed in the soil and also the root cannot absorb water and mineral salts that are necessary for photosynthesis process.

3. The concentration of soil solution is higher than the concentration of the solution inside the root hairs.

Water will pass from the vacuole of the the root to the soil by osmosis and the plant will wilt and die.

4. The wood tissue disappears from the plant.

Water cannot transfer from the root to the stem and leaves.

5. The two guard cells of the stoma cannot change their shapes.

The stoma cannot be opened or closed.

6. There are no stomata on the plant leaves.

The plant cannot get rid of excess water by transpiration process.

7. The plant carries out transpiration process inside a bell jar.

Water drops are condensed on the inner surface of the bell jar.

8. There is no osmosis feature in the plant.

Water cannot transport from the soil to the root hairs, so the plant will wilt and die.

9. Absence of cell membrane of the root hairs.

The root hairs cannot control passing of some types of salts according to the plant's need.

## 5 Comparison

Comparison between osmosis feature and transpiration process :

Points of comparison	Osmosis feature	Transpiration process
1. Definition :	It is the transmission of water molecules through semi-permeable membrane from an area with high concentration of water to an area of low concentration of water.	It is a vital process by which the plant loses excess water in the form of water vapour through stomata which spread on the two surfaces of the leaf and other green parts to the surrounding environment of the plant.
2. Takes place in :	The root system.	All the green parts of the plant.



## 6 Activities



### Activity

To show the transpiration process in plant

#### Steps:

1. Cover the soil and planter with a fabric coated with vaseline.
2. Put the planter under the bell jar and over the glass board, then leave it for several hours.

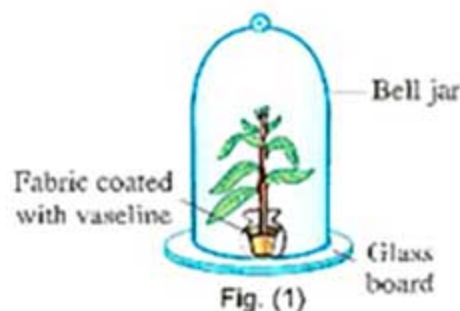


Fig. (1)



Fig. (2)

#### Observation:

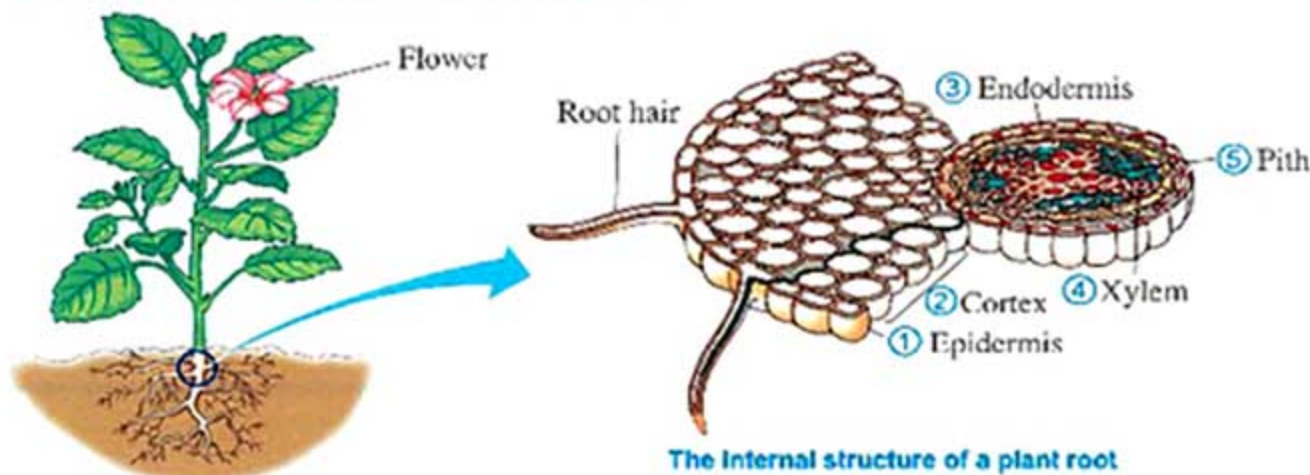
Water drops are condensed on the inner surface of the bell jar.

#### Conclusion:

The green parts of plant get rid of the excess water through stomata by transpiration process.

## 7 Important drawings

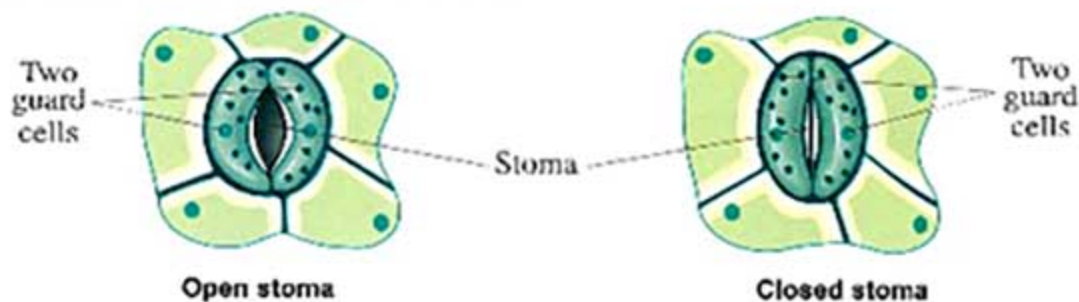
### 1. The internal structure of a plant root.



The internal structure of a plant root



## 2. The closed stoma and open stoma.



Open stoma

Closed stoma

## 8 Main Points

- Green plants form their food by **photosynthesis process**.
- In the photosynthesis process, the green plant needs :
  - **Carbon dioxide** from air.
  - **Water and mineral salts** from soil.
  - **Light energy**.
- Green plant needs very little amounts of mineral salts that are necessary for plant life such as :
  - **Phosphorus.**
  - **Magnesium.**
  - **Calcium.**
  - **Nitrogen.**
  - **Zinc and other elements.**
- The root is composed of a number of layers which are :
  - **Epidermis layer** (the external layer).
  - **Cortex layer** (follows the epidermis layer).
  - **Endodermis layer** (follows the cortex layer).
  - **Xylem** (wood tissue that follows the endodermis layer).
  - **Pith layer** (the last layer that follows the xylem).
- The endodermis regulates passing of **water** to **xylem**.
- Root hairs extend from the cells of the **epidermis layer**.
- Each root hair has a **big vacuole** that contains **salt solution**.
- The high concentration of salt solution means that it contains a **small amount of water**, so this solution has **low concentration of water**.



## Final Revision

9. The low concentration of salt solution means that it contains a **big amount of water**, so this solution has **high concentration of water**.
10. The transmission of water from soil to the vacuole of the root hairs occurs by **osmosis feature**, while the transmission of mineral salts from soil to the root hairs occurs by **selective permeability**.
11. Plants get rid of excess water through the **transpiration process**.
12. Stomata are widely spread on **the lower surfaces** of the plant leaves.
13. Each **stoma** is surrounded by **two guard cells**.





PART

3

# Final Examinations



## Important note :

There is an additional question at the end of the school's examinations on the parts which are canceled from the syllabus of the previous year.



1

Cairo Governorate

Manor House International Schools

Answer the following questions :

## 1. Complete the following statements :

- The fluorescent lamp contains the inert ..... gas and a little amount of .....
- If the effort force is larger than the resistance force, ..... is longer than the .....
- The ..... eclipse doesn't harm the eye, while ..... eclipse causes harm to eye.
- Electric lamps convert ..... energy into ..... energy.
- The fixed point where the rigid bar rotates on is called .....
- The ..... rotates around the Earth in ..... shape orbit.
- Levers were first described by a scientist whose name is .....

## 2. Write the scientific term :

- The method of connecting electric lamps and machines at home. (.....)
- A phenomenon occurs when a part of the Moon lies in umbra. (.....)
- The type of levers where the effort force is always smaller than the resistance force. (.....)

## 3. [A] Give reasons for :

- We can't see the Sun during the solar eclipse.  
.....  
.....
- Water pump is a first class lever.  
.....  
.....
- We must not touch any electric machine with wet hand.  
.....  
.....



**[B] Problem :**

A lever is affected by force 100 N, the length of force arm is 5 cm., and resistance arm is 20 cm, Calculate the resistance force and mention if this lever saves effort or not.

.....

.....

.....

.....

.....

**4. [A] What happens when ... ?**

1. The effort force is between the resistance force and fulcrum.
2. The Earth prevents all the sunlight from reaching the Moon's surface.

**[B] 1. This device is :**

2. Label the figure :

- ① .....
- ② .....
- ③ .....
- ④ .....
- ⑤ .....

**Additional questions****[A] Put (✓) sign in front of correct statements and (x) sign in front of false statements :**

1. Plant loses water in the form of water vapour in photosynthesis process. ( )
2. Endodermis layer regulates the passing of water to the xylem. ( )

**[B] Write the scientific term of the following :**

1. The vital process by which green plants make their own food. ( )
2. The energy needed for the plant to form its food. ( )



2

Cairo Governorate

Patriarchal College

Answer the following questions :

## 1. [A] Complete the following statements :

1. The values of effort force and resistance force depend on ..... and .....
2. Increasing the temperature of the electric machines may cause .....
3. The inner surface of the tube of the fluorescent lamp is covered with .....
4. The ..... leads to destroying the tissues of the body.
5. The lever saves effort if the ..... arm is shorter than ..... arm.
6. .... phenomenon always occurs when the Moon hides the Sunlight during its movement in front of it.

## [B] What happens ... ? Why ?

1. A piece of glass is inserted in a closed simple electric circuit.  
.....  
.....
2. The electric fires are put out by water.  
.....  
.....

## 2. [A] Write the scientific term :

1. One of the dangers of electricity occurs as a result of the passage of the electric current through the human body. ( ..... )
2. It is an eclipse that occurs when a part of the Moon enters the shadow area of the Earth. ( ..... )
3. Falling a person from a ladder as a result of electric shock. ( ..... )
4. The area appears between the lighted area and the real shadow area and we can see a part of the light source if we stand in this area. ( ..... )

## [B] Mention the function of :

1. Filament.  
.....  
.....
2. The battery in the electric circuit.  
.....  
.....



[C] Mention 2 differences between connection in series and connection in parallel.

.....

.....

.....

.....

3. [A] Choose the correct answer :

- Plugging more than one machine to one socket causes .....
  - electric shock.
  - electric fire.
  - overload.
  - overload and electric fire.
- The lunar eclipse occurs in the ..... phase.
  - new Moon
  - crescent
  - full Moon
  - first quadrature
- The electric shock may cause .....
  - electric fire.
  - electric overload.
  - electric burn.
  - no correct answer.
- When the Moon looks slightly faint, it indicates .....
  - total lunar eclipse.
  - partial lunar eclipse.
  - partial solar eclipse.
  - no eclipse.

[B] What is meant by ... ?

- Electric circuit : .....
- Total lunar eclipse : .....

[C] The exerted force of a lever equals 200 N and the resistance value is 1000 N. If the arm of force is 50 cm. Find the value of the arm of resistance and what's the kind of this lever ?

.....

.....

.....

.....



## Final Examinations

## 4. [A] Put (✓) or (x) and correct the wrong :

1. The electric lamp converts electric energy into kinetic energy. ( )
2. When we connect more than one lamp in series, the light intensity decreases by increasing their numbers. ( )
3. The crowbar is considered from the third class lever but it saves effort. ( )
4. The duration of solar eclipse is less than the duration of lunar eclipse. ( )

## [B] Give reasons for :

1. Don't look directly at the Sun with naked eye during the solar eclipse.
2. In second class levers, the effort force is always less than resistance force.

## [C] Mention 4 precautions on dealing with electricity.

## Additional questions

## [A] Complete the following statements :

1. Plants do ..... process to make their own food.
2. Any plant consists of root system and .....

## [B] What happens if ... ?

1. A plant is kept in dark for a long period of time.
2. The two guard cells of a stoma cannot change their shapes.



Answer the following questions :

1. [A] Choose the correct answer :

- The phenomenon of the lunar eclipse occurs on the ..... day of the lunar month.  
a. 10<sup>th</sup>                      b. 14<sup>th</sup>                      c. 25<sup>th</sup>                      d. 28<sup>th</sup>
- Lever that has the fulcrum between the force and the resistance .....  
a. wheelbarrow.                      b. seesaw.                      c. nutcracker.                      d. tweezers.
- Tungsten is preferred to use in electric lamps because of .....  
a. its low melting point.                      b. its high melting point.  
c. its bad conductivity.                      d. its high boiling point.
- In second class lever if the distance between resistance and fulcrum 15 cm ,so the distance between effort force and fulcrum must be equal .....  
a. 5 cm.                      b. 20 cm.                      c. 15 cm.                      d. 10 cm.

[B] From the opposite figures (a) and (b) answer the following questions :

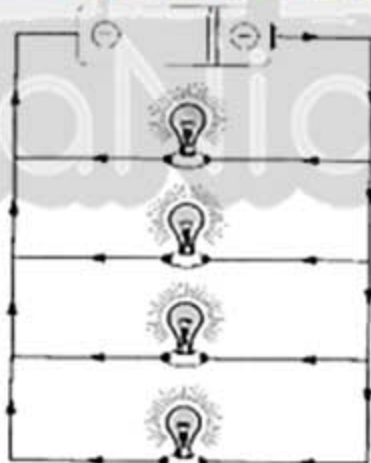


Fig. (a)

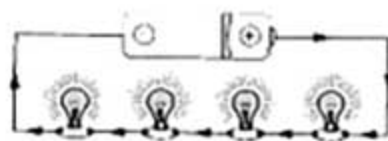


Fig. (b)

- What is the way of connection in each circuit ?  
a. .... b. ....
- What happens when the light bulb number (2) in each circuit burns out ?  
a. ....  
b. ....



## Final Examinations

## [C] What happens when ... ?

1. The Earth, the Moon and the Sun are in one straight line and the Moon is in the middle.  
.....
2. The electric fires are put out by water.  
.....

## 2. [A] Write the scientific term :

1. Type of levers that always doesn't save effort. (.....)
2. One of the electric dangers occurs as a result of the passage of the electric current through the human body. (.....)
3. It occurs when the whole Moon enters the semi - shaded area of the Earth. (.....)
4. A tool that changes electric energy into light energy. (.....)

[B] The exerted force on a first-class lever equals 500 Newton and the length of its arm is 20 cm when the value of resistance force is 200 Newton find the value of the arm of the resistance in this example is the lever in state of balance or not and why ?

.....

.....

.....

## [C] (1) Look at the following figure and answer the following :



- ① ..... ② ..... ③ ..... ④ .....

(2) When whole Moon enters to the umbra area of Earth it seems with ..... colour because .....

.....

## 3. [A] Mention one use for :

1. Tweezers : .....
2. Argon gas in light bulb : .....



[B] Compare between the solar and lunar eclipse. (two points only).

Solar eclipse	Lunar eclipse
.....	.....
.....	.....
.....	.....
.....	.....

[C] These people are wearing a special type of glasses to observe an astronomical phenomenon.

a. What is the name of this phenomenon ?

b. Mention the reason for using these glasses to observe this phenomenon.



4. [A] Correct the following sentences without changing the underlined words :

1. Glass tube in the light bulb contains mercury vapour.

2. The type of levers which never save effort is the 2<sup>nd</sup> class levers.

3. Copper and iron are electric insulators.

4. The coal holder is used in increasing distance.

[B] Give reasons for :

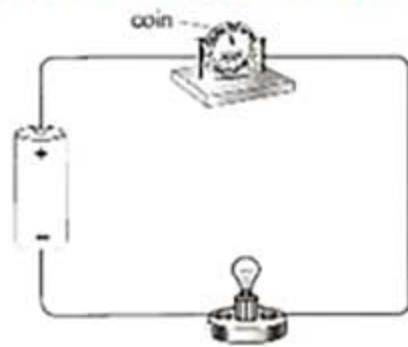
1. Solar and lunar eclipse can be predicted.

2. The heater shouldn't be placed in a touching position of textiles and carpets.

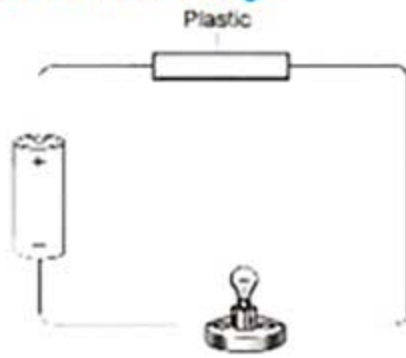


## Final Examinations

[C] Look at the opposite figures, then answer the following :



Circuit (A)



Circuit (B)

Which circuit becomes closed when the wire is connected to the light bulbs ?  
Why ?

.....

.....

.....

## Additional questions

[A] Put (✓) sign in front of correct statements and (X) sign in front of false statements :

1. Osmosis is a biological process in which the plant loses water in the form of water vapour. ( )
2. The outermost layer of the plant's root is cortex. ( )

[B] Give reasons for the following :

1. Plants make photosynthesis process.  
.....
2. The two guard cells change their shapes from time to time.  
.....

4

Cairo Governorate

East Naser City Educational Directorate

Answer the following questions :

1. Write the scientific term :

1. The fixed point of a rigid bar. (.....)
2. Levers that sometimes conserve the effort. (.....)



3. The scientist who invented the light bulb. (.....)
4. The way by which the bulbs are connected by branching routes and the lighting of the lamps is not affected with increase in their number. (.....)
5. A dark inner shadow in which total solar eclipse appear. (.....)
6. A type of solar eclipse in which the Sun appears as lighting ring and is formed when the Moon is in a higher orbit from the Earth. (.....)

## 2. [A] Problem :

A force of 50 N affects a lever of the 2<sup>nd</sup> class lever its force arm 20 cm, calculate the resistance given that the arm of the resistance = 5 cm.

.....  
 .....  
 .....

## [B] Put (✓) in front of the right statements and (x) in front of wrong one :

1. The 3<sup>rd</sup> class lever always save effort. ( )
2. The light bulb contains atmospheric air. ( )
3. The electric lamps are connected in the house in series. ( )
4. The duration of the solar eclipse does not exceed 7 minutes and 40 seconds. ( )

## 3. Complete the following :

1. The lunar eclipse occurs in the ..... of lunar month.
2. .... eclipse occurs when the Moon comes between the Sun and Earth.
3. When the electric lamps are connected in parallel with others the light intensity .....
4. The filament of the light bulb is made of .....
5. The crowbar is considered a ..... class lever.
6. The force and the resistance are equal in levers if .....

## 4. [A] Correct the underlined words :

1. Nutcracker is considered from 3<sup>rd</sup> class lever. (.....)
2. The force between the resistance and fulcrum in the 1<sup>st</sup> class lever. (.....)
3. If the arm of force is smaller than the arm of resistance then the lever saves the effort. (.....)
4. The solar eclipse occurs when the Earth located between Sun and Moon. (.....)



## Final Examinations

## [B] Give reasons for :

1. Seesaw is the 1<sup>st</sup> class lever and wheelbarrow is 2<sup>nd</sup> class lever.
- .....
- .....

2. Water is not used to put out electric fires.
- .....
- .....

## Additional questions

## [A] Complete the following statements :

1. Any plant consists of root system and .....
2. Plants lose water in the form of the water vapour through ..... process.

## [B] Write the scientific term of the following :

1. Openings through which the plant under goes the transpiration process. (.....)
2. The root layer, where the root hairs extend. (.....)

5

Cairo Governorate

Rod -El-Farag Directorate  
Saint Mary's School

## Answer the following questions :

## 1. [A] Choose the right answer :

1. Glass bulb in electric lamp contains ..... gas.  
a. hydrogen      b. oxygen      c. argon      d. nitrogen
2. The ..... eclipse takes place when a part of the Moon lies in the shadow area of Earth.  
a. total lunar      b. partial lunar      c. total solar      d. partial solar
3. From the second class lever is .....  
a. sweet holder.      b. crowbar.      c. nutcracker.      d. seesaw.
4. The filament of the electric lamp is made up of .....  
a. iron.      b. tungsten.      c. copper.      d. aluminium.
5. .... is a fixed point that a rigid bar rotates on.  
a. Resistance      b. Force      c. Fulcrum      d. Lever
6. The electric lamp converts the electric energy to the ..... energy.  
a. sound      b. light      c. kinetic      d. potential



7. When an electric lamp which connected in series with other burns .....  
 a. the light intensity increases.                      b. the light intensity decreases.  
 c. all lamps turn off.                                      d. no correct answer.
8. .... is considered from electric conductors.  
 a. Iron                      b. Plastic                      c. Wood                      d. Eraser

**[B] Give reason for each of the following :**

1. Some of the levers are important to man although they do not save effort.  
 .....  
 .....
2. The light bulbs are connected in parallel in the house.  
 .....  
 .....

**2. [A] Write the scientific term of each of the following :**

1. One of the dangers of electricity occurs as a result of the passage of the electric current to the human body. ( ..... )
2. The astronomical phenomenon occurs when Moon lies between Sun and Earth on the same line. ( ..... )
3. Levers have the resistance force between the effort force and fulcrum. ( ..... )
4. A material that is used to cover the inner surface of the glass bulb of the fluorescent lamp. ( ..... )
5. A vapour used with argon gas to fill the glass tube of the fluorescent lamp. ( ..... )
6. A type of lunar eclipse occurs when the whole Moon enters the shadow area of Earth. ( ..... )

**[B] What happens if ... ?**

1. You insert a metal bar in an electric socket.  
 .....
2. You place the electric heater too close to furniture and rugs.  
 .....
3. Looking at the solar eclipse without special glasses.  
 .....



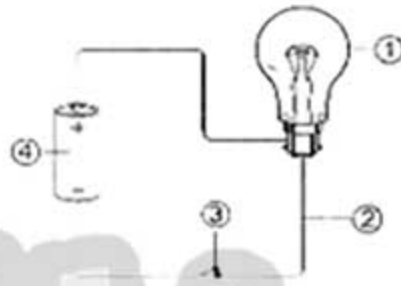
## Final Examinations

## 3. [A] Complete the following statements :

1. There is a conservation of effort for the first class levers if the ..... is larger than .....
2. The manual broom is an example of the ..... levers.
3. You can not put out the electric fire with water because water is .....
4. The lunar eclipse may last for more than .....
5. The ..... lever may have effort arm equals the resistance arm.

## [B] Label this figure :

- ① .....
- ② .....
- ③ .....
- ④ .....



## [C] In the second class lever, the effort force is 50 Newton and its arm is 20 cm. if the resistance arm is 5 cm. Calculate the value of the resistance.

.....

.....

.....

## 4. [A] Put (✓) or (x) in front of the following :

1. The lunar eclipse can be easily seen from the surface of the Earth by the naked eye. ( )
2. The scissors is a second class lever. ( )
3. Indirect injuries of electricity result from falling from top of a ladder due to an electric shock. ( )
4. Parallel connection has many branching routes. ( )
5. The Moon revolves around the Earth in an oval shape orbit. ( )
6. The rate of occurrence of lunar eclipse is two eclipses per year. ( )

## [B] Define :

Lever.

.....

.....



## [C] Mention :

1. One reason of electric burn.  
.....
2. One precaution in dealing with electricity.  
.....

## Additional questions

## [A] Choose the correct answer :

1. Transpiration is a vital process, where the plant is ..... water.  
a. gaining      b. absorbing      c. losing      d. (a) , (b) and (c)
2. Plant absorbs water by .....  
a. flowers.      b. root hairs.      c. stem.      d. leaves.

## [B] Put (✓) sign in front of correct statements and (✗) sign in front of false statements :

1. Root hairs extend from the cells of the endodermis layer. ( )
2. The outermost layer of the plant's root is cortex. ( )

Answer the following questions :

## 1. Complete the following statements :

1. The crowbar is a ..... class lever, but the manual broom is a ..... class lever.
2. Some of the types of electric lamps are ..... and .....
3. ...., ..... and ..... are examples of materials which are electric insulators.
4. You can't put out the electric fires with water because water is .....
5. .... and ..... are two ways of connecting the electricity.
6. In the solar eclipse, ..... lies between Earth and the Sun.
7. An ..... solar eclipse is formed when the Moon is in the higher orbit from the Earth.



## Final Examinations

## 2. [A] Match :

(A)	(B)
1. Third class lever	a. levers that always save the effort.
2. Second class lever	b. levers that never save the effort.
3. Lever	c. levers that sometimes save the effort.
4. First class lever	d. a rigid bar rotates around a fixed point and is affected by a force and a resistance.

1. ....

2. ....

3. ....

4. ....

[B] The exerted force of the first class lever equals 500 Newton and the length of its arm is 20 cm and is affected by a resistance with a value of 200 Newton. Find the value of the arm of the resistance.

.....

.....

## 3. Write the scientific term :

- The fixed point of a rigid bar on which it rotates. (.....)
- Levers that have the effort force between the resistance and the fulcrum. (.....)
- The way where the bulbs are connected by branching routes and the lighting of the lamps isn't affected with increase in their numbers. (.....)
- One of the dangers of the electricity occurs as a result of the passage of the electric current through the human body. (.....)
- Occurs when part of the Moon enters the shadow area only. (.....)
- Occurs when the Moon hide all sunlight and we can't see the Sun totally. (.....)

## 4. [A] Give reasons for :

- The filament of the light bulb is made of tungsten.  
.....
- Not placing flammable materials too close to the electric machine which produces heat energy.  
.....
- No annular lunar eclipse is formed like the annular solar eclipse.  
.....



4. We shouldn't look at the Sun directly by the naked eye.

.....

.....

[B] Put (✓) or (x) :

- The two phenomena of lunar and solar eclipse are repeated regularly and can be predicted. ( )
- The lunar eclipse can be easily seen from the surface of the Earth by the naked eye. ( )

#### Additional questions

[A] What happens if ... ?

- The two guard cells of a stoma cannot change their shapes.
- A plant is kept in dark for a long period of time.

[B] Give reasons for the following :

- Plants make photosynthesis process.
- The two guard cells change their shapes from time to time.

7

Giza Governorate

Experimental Language  
Schools Inspectorate

Answer the following questions :

1. [A] Complete the following :

- ..... and ..... are examples of first class levers.
- The types of lunar eclipse are ..... and .....
- The fluorescent lamp contains ..... gas and a little amount of .....

[B] Correct the underlined words :

- The effort force and resistance force are equal in the second class lever. ( )



## Final Examinations

2. The electric fire occurs as a result of passing the electric current through the human body. ( ..... )
3. The electric lamp is used to change kinetic energy into light energy. ( ..... )

## 2. [A] Write the scientific term for each of the following :

1. The way where the bulbs are connected by branching routes. ( ..... )
2. Materials that allow electricity to pass through. ( ..... )
3. A rigid bar that rotate around fixed point and has effort force and a resistance force. ( ..... )
4. It is a closed and continuous path through which the electric current passes. ( ..... )

## [B] Give a reason for :

The filament of electric lamp is made of tungsten.

.....

## 3. [A] Choose the correct answer :

1. All the following are bad conductors of electricity except .....  
 a. copper.                      b. plastic.                      c. rubber.
2. The lunar eclipse occurs in the ..... of the lunar month.  
 a. end                      b. middle                      c. beginning
3. All the following are from the importance of levers except .....  
 a. increasing force.                      b. increasing size.                      c. increasing speed.
4. .... is a type of lever that always save effort.  
 a. First                      b. Second                      c. Third

[B] If the force arm is 5 cm, and the resistance arm is 2 cm, if the resistance force is 10 N. Calculate the effort force.

.....

.....

.....



## 4. [A] Put (✓) or (✗) :

1. In houses, the electric lamps are connected in parallel. ( )
2. The distance between resistance force and fulcrum is called effort force arm. ( )
3. The scientist Newton who invented the light bulb. ( )
4. The manual broom increases the speed. ( )

## [B] What happens if ... ?

Water is used to put out electric fires.

## Additional questions

## [A] Complete the following statements :

1. Plants lose water in the form of the water vapour through ..... process.
2. Any plant consists of root system and .....

## [B] Write the scientific term of the following :

1. The vital process by which green plants make their own food. ( ..... )
2. The energy needed for the plant to form its food. ( ..... )

8

Alexandria Governorate

Brilliance Language School

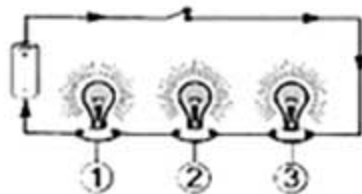
Answer the following questions :

## 1. [A] Complete the following statements :

1. Nutcrackers are from the ..... class levers, while scissors are from the ..... class levers.
2. The filament of the light bulb is made of ..... because it has a high .....
3. .... eclipse occurs when ..... comes between the Sun and Earth.
4. Electric wire are made of ..... because it is a ..... of electricity.

## [B] In the opposite circuit :

1. The bulbs are connected in .....
2. What happens if the bulb number 2 is burnt ?





## Final Examinations

## 2. [A] Write the scientific term :

1. Substances that don't allow electricity to pass. ( ..... )
2. One of the dangers of electricity that results from the passing of an electric current through the human body. ( ..... )
3. A fixed point which the bar rotates around. ( ..... )
4. The lunar eclipse in which the whole Moon lies in the umbra area of the Earth. ( ..... )

[B] Calculate the length of the force arm in a lever if you know that the value of the force is 100 N, the resistance is 200 N, and the length of the resistance arm is 20 cm.

.....

.....

## 3. [A] Choose the correct answer :

1. .... is considered from the third class levers.
  - a. Fishing hook
  - b. Seesaw
  - c. Bottle opener
2. The inventor of the electric lamp is .....
  - a. Daniel Rutherford.
  - b. Edison.
  - c. Newton.
3. From the electric insulator substances is .....
  - a. rubber.
  - b. iron bar.
  - c. aluminium bar.
4. When the whole Moon enters the semi-shaded area of the Earth ..... occurs.
  - a. solar eclipse
  - b. lunar eclipse
  - c. no eclipse

## [B] Give reasons for :

1. Water is not used in putting out electric fires.
- .....
- .....

2. Second class levers always save effort.
- .....
- .....



## 4. [A] Put (✓) or (x) and correct the wrong ones :

1. Arm of force in the third class lever may be equal to resistance arm. ( )
2. Looking at the lunar eclipse causes great harms for eyes. ( )
3. A fluorescent lamp contains little amount of mercury vapour and argon gas. ( )
4. The human body is a bad conductor of electricity. ( )

## [B] What happens when ... ?

1. The electric lamp contains atmospheric air from inside.
2. The resistance arm is longer than the force arm in the lever.

## Additional questions

## [A] Choose the correct answer :

1. The plant makes its own food through ..... process.  
a. respiration      b. digestion      c. sensation      d. photosynthesis
2. The stoma in a plant is surrounded by ..... guard cells.  
a. two      b. three      c. four      d. five

## [B] What happens if ... ?

1. A plant is kept in dark for a long period of time.
2. The two guard cells of a stoma cannot change their shapes.



9

Alexandria Governorate

El-Agamy Educational Directorate

Answer the following questions :

## 1. Complete the following statements :

1. Crowbar is considered from levers of ..... class, while the manual broom is considered from levers of ..... class.
2. The filament of the electric lamp is made of ..... because it has a high .....
3. Harms of the electric shock depends on ..... and .....

## 2. [A] What happens when ... ?

1. The whole Moon enters the penumbra area of the Earth.  
.....
2. The glass bulb of the light bulb is filled with air instead of argon gas.  
.....

## [B] Choose the correct answer :

1. All of the following are from the importance of the levers except .....  
 a. increasing force.                      b. increasing distance.  
 c. decreasing the speed.                d. saving effort.
2. From the materials which are the electric insulators .....  
 a. iron.                      b. rubber.                      c. copper.                      d. lead.
3. From the levers that are used to avoid danger is .....  
 a. coal holder.                      b. scissors.                      c. seesaw.                      d. wheelbarrow.
4. The astronomical phenomenon that occurs to the Moon when Earth comes between the Sun and the Moon is .....  
 a. annular solar eclipse.                      b. total solar eclipse.  
 c. lunar eclipse.                      d. solar eclipse.

## 3. [A] Give reasons for each of the following :

1. The nutcracker is considered a second class lever.  
.....  
.....
2. The glass bulb of the light bulb is filled with inert argon gas.  
.....  
.....



[B] Write the scientific term for each of the following :

1. A tool used to convert the electric energy into light energy. ( ..... )
2. A danger of electricity that causes the damage of tissue. ( ..... )
3. The material that covers the inner surface of the fluorescent lamp. ( ..... )
4. The fixed point of the rigid bar. ( ..... )

4. [A] A force affecting a second class lever is 400 Newton and the length of its arm is 100 cm. and has a resistance with a value 800 Newton. Calculate the value of the arm of resistance.
- .....
- .....
- .....

[B] Identify the astronomical phenomenon in the following figure :

1. Name the phenomenon :
- .....

2. Label the figure :

- ① .....  
 ② .....  
 ③ .....



### Additional questions

[A] Complete the following statements :

1. Any plant consists of root system and .....
2. Plants do ..... process to make their own food.

[B] Give a reason for the following :

Plants make photosynthesis process.

.....



10

Alexandria Governorate

East Zone Educational Directorate

Answer the following questions :

## 1. [A] Complete the following sentences :

1. The distance between the fulcrum and the force is called ..... , while the distance between the resistance and the fulcrum is called .....
2. Electric lamps convert ..... energy into ..... energy.
3. The solar eclipse occurs when ..... , ..... and the Earth are on a straight line.
4. Iron is considered as ..... conductor of electricity, while wood is ..... conductor of electricity.

## [B] What happens if ... ?

1. A part of the Moon enters the shadow area of the Earth.  
.....
2. The electric lamps in the houses are connected in series.  
.....

## 2. [A] Write the scientific term for each of the following :

1. The fixed point of a rigid bar. ( ..... )
2. One of the dangers of electricity that occurs as a result of the passage of the electric current through the human body. ( ..... )
3. An inert gas that is found in the glass bulb of the electric lamp. ( ..... )

[B] The exerted force of the first class lever equals 500 Newton and the length of its arm is 20 cm. and is affected by a resistance with a value of 20 Newton. Find the value of the arm of the resistance.  
.....  
.....  
.....

## 3. [A] Put (✓) in front of the correct statements and (X) in front of the wrong ones :

1. Water is used to put off electric fires. ( )
2. The second class levers save effort. ( )
3. The effort force is measured in centimetre or metre. ( )
4. Crowbar is an example of the first class levers. ( )



**[B] Give reason for each of the following :**

1. Doctors warn from the direct observation of the Sun during solar eclipse.

.....  
 .....

2. The Moon is coloured in red at the start of the total lunar eclipse.

.....  
 .....

**4. [A] Choose the correct answer :**

1. Which of the following levers is used to avoid dangers .....

- a. coal holder.                      b. scissors.                      c. manual broom.

2. The duration of the solar eclipse is ..... than the duration of the lunar eclipse.

- a. greater                      b. less                      c. equal

3. All of the following levers don't save effort except .....

- a. ice holder.                      b. hockey bat.                      c. nutcracker.

4. When the electric lamp connected in parallel with others in the electric circuit, the light intensity .....

- a. decreases.                      b. increases.                      c. doesn't change.

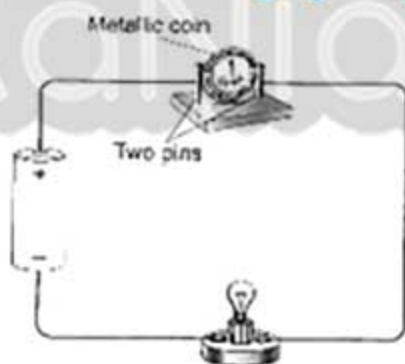
**[B] Look at the following figures, then answer :**

Fig. (a)

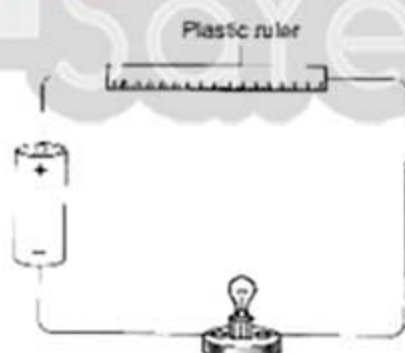


Fig. (b)

In which figure the light bulb will light up when the electric wires connected to the bulb ? And why ?

.....  
 .....



### Additional questions

[A] What happens if ... ?

1. The two guard cells of a stoma cannot change their shapes.
2. A plant is kept in dark for a long period of time.

**[B] Put (✓) sign in front of correct statements and (X) sign in front of false statements :**

1. Plant loses water in the form of water vapour in photosynthesis. ( )
2. Water rises inside the plant stem through the wood tissue. ( )

## 11 Alexandria Governorate

El-Gomrok Educational Directorate

**Answer the following questions :**

**1. [A] Complete the following statements :**

1. .... occurs when Earth, Moon and Sun are nearly on one straight line with the Moon in the middle.
2. Iron is considered as an electric ....., while wood is considered as an electric .....
3. The bottle opener and wheelbarrow are levers of the ..... kind, while the manual broom is levers of the ..... kind.

**[B] Problem :**

The exerted force of the first class lever equals 500 Newton and the length of its arm is 20 cm and is affected by a resistance with a value of 200 Newton. Find the resistance arm.

The law of lever = ..... × ..... = ..... × .....  
 = ..... × ..... = ..... × .....  
 = .....

**2. [A] Choose the correct answer :**

1. Which of the following is found in the fluorescent lamp but not found in the electric lamp ? .....
- a. Neon.                      b. Argon.                      c. Mercury vapour.



- 110



[C] What is function of number 2 ?

### Additional questions

[A] Complete the following statements :

1. Plants lose water in the form of the water vapour through ..... process.
2. Any plant consists of root system and .....

[B] Write the scientific term of the following :

1. The vital process by which green plants make their own food. ( ..... )
2. The energy needed for the plant to form its food. ( ..... )

12

Alexandria Governorate

Middle Zone Educational Directorate

Answer the following questions :

1. [A] Complete the following statements :

1. The ..... type of lever always conserves effort, while the ..... type always doesn't conserve effort.
2. Some levers make the tasks perform more easily by avoiding .....
3. Water pump is a ..... class lever, while ..... is a third class.
4. From the types of electric lamps are ..... and .....
5. The ..... phenomenon occurs when the ..... hides sunlight from a part of the Earth.

[B] What happens when ... ?

A spark resulting from the electric fires touches any part of a human body.

2. [A] Write the scientific term :

1. A way of electric connection, in which light intensity of bulbs decreases by the increase in their number. ( ..... )
2. A part of light bulb that connects the base with the filament of the lamp. ( ..... )
3. One of the dangers of electricity causes damage to the body tissues. ( ..... )



[B] Compare between solar and lunar eclipse according to the following :

Points of comparing	Solar eclipse	Lunar eclipse
The body that hides sunlight :	.....	.....
Occurrence time :	.....	.....
Duration time :	.....	.....

### 3. Choose the correct answer :

- The force that is exerted to equilibrate the resistance is called .....  
a. fulcrum.                      b. effort.                      c. friction.                      d. fulcrum & effort.
- ..... is/are used to pick up very small objects.  
a. Coal holder                      b. Tweezers                      c. Manual broom                      d. Seesaw
- The effort force and the resistance force are measured in .....  
a. Newton.                      b. Hertz.                      c. metre.                      d. cubic centimetre.
- Which of the following is found in fluorescent lamp and is not found in electric bulb ? .....  
a. Neon.                      b. Argon.                      c. Mercury.                      d. Water vapour.
- Connecting more than one electric device in the same socket leads to .....  
a. electric shock.                      b. overload.                      c. electric burn.                      d. electric shock & burn.
- The Moon seems red when it is totally in the ..... of the Earth.  
a. umbra area                      b. penumbra area                      c. extension of the cone shadow                      d. no correct answer

### 4. [A] Calculate the following :

- Find the length of resistance arm if you know that the effort force is 200 N, the force arm is 20 cm. and affects on a resistance of 400 N.  
.....  
.....

- Does the lever save effort or not ? Why ?  
.....  
.....



## Final Examinations

## [B] Give reason for the following statements :

1. We should not look directly at the Sun with the naked eye.

.....

.....

2. Pressing on the chest of electric injured with palms.

.....

.....

## Additional questions

## [A] Choose the correct answer :

1. Root hairs extend from cells of ..... layer.

a. epidermis      b. cortex      c. endodermis      d. xylem

2. Tiny holes in the plant leaves are called .....

a. roots.      b. stoma.      c. seeds.      d. root hairs.

## [B] Give reasons for the following :

1. Each stoma is surrounded by two guard cells.

.....

2. Plants make photosynthesis process.

.....

.....

## 13 Al Qaliubya Governorate

## Al Resala Language School

## Answer the following questions :

## 1. [A] Complete the following statements :

1. The crowbar is considered a ..... lever but the manual broom is considered a ..... lever.

2. The types of lunar eclipse are ..... and .....

3. ...., ..... and ..... are examples of materials that are electric conductors.

4. The type of levers that always conserves effort is ....., while the type of levers that always doesn't conserve effort is .....

5. .... and ..... are two ways of connecting electric circuits.

6. The light bulb consists of ....., ..... and .....

7. The lever doesn't save effort when ..... arm is shorter than the ..... arm.



**[B] Correct the underlined words :**

1. In the third class levers the force arm may be equal to the resistance arm. ( ..... )
2. To observe lunar eclipse you need special glasses. ( ..... )
3. We put off electric fires by water. ( ..... )
4. The fluorescent lamp contains inert gas neon. ( ..... )
5. The fishing hook is an example on first class levers. ( ..... )
6. The lunar eclipse occurs five times per year. ( ..... )
7. Touching the spark that results from electric fires causes electric shock. ( ..... )
8. When the effort force = 20 N , resistance is 8 N and the effort force arm = 4 cm , so the resistance arm = 100 cm. ( ..... )

**2. [A] Put (✓) or (x) :**

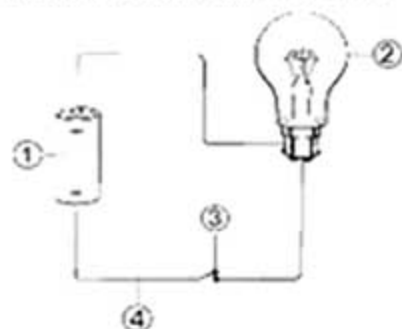
1. The spiral base has two pieces of lead. ( )
2. It is safe to observe the solar eclipse with naked eyes directly. ( )
3. The effort arm is measured in centimetre or metre. ( )
4. On connecting the light bulbs in series, the lighting of the bulbs decreases by increasing the number of bulbs. ( )
5. Touching a naked wire that has an electric current passing through it causes an electric fire. ( )
6. Bottle opener is a kind of levers that pick up the very small objects. ( )

**[B] What happens when ... ?**

1. Both of force arm and resistance arm equal 10 metres.  
.....
2. A part of your body touches an electric iron that is connected to electricity.  
.....
3. The Moon comes between the Sun and the Earth on one straight line.  
.....

**[C] Write the labels, then answer :**

1. ① .....
- ② .....
- ③ .....
- ④ .....





2. The part no. ③ should be ..... in order to the light bulb glows.  
a. closed.                      b. opened.                      c. unimportant.
3. If we insert a piece of wood in this circuit, it will be a (an) .....  
a. closed.                      b. opened.                      c. both (a) and (b).

**3. [A] Write the scientific term :**

1. The faint outer shadow area. ( ..... )
2. The fixed point of a rigid bar on which the bar rotates. ( ..... )
3. Effort force  $\times$  Its arm = Resistance  $\times$  Its arm. ( ..... )
4. The metal that is used in making the filament of the fluorescent lamp. ( ..... )
5. The type of lunar eclipse in which the whole Moon enters the umbra of the Earth. ( ..... )
6. The type of levers that its mid-point is the effort force. ( ..... )

**[B] Give reasons for :**

1. The light bulbs are connected in parallel in the house.

.....

.....

2. The nail clipper saves effort.

[illegible]

[C] Give an example for :

1. A first class lever that saves effort :

.....

2. An increasing speed lever :

=====

3. A type of material that covers the inner surface of fluorescent lamp :

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4. A precaution that you should follow on dealing with electricity :

.....

**4. [A] Choose the correct answer :**

1. During the start of the total lunar eclipse, the Moon colour tends to be

[illegible]

- a. yellow.                      b. orange.                      c. red.

2. Increasing the temperature of the electric machines causes .....

- a. electric shock.      b. electric burn.      c. electric fire.







## Final Examinations

4. What happens if a part of the Moon enters the area (2) during its path ?  
.....

## Additional questions

## [A] What happens if ... ?

1. Root system is not extended between the soil particles.  
.....  
.....

2. There is no osmosis feature in the plant.  
.....

## [B] Complete the following statements :

1. Plants do ..... process to make own food.  
2. The outermost layer of a plant root is called .....

14

Menofia Governorate

Shebeen El-Koum Educational Directorate

Answer the following questions :

## 1. [A] Complete the following statements :

1. From the first class lever ..... and .....  
2. The ..... is between Sun and ..... in the solar eclipse.  
3. The harms resulted from the electric shock depend on ..... and .....  
4. From the second class levers ..... and from the third class levers .....

## [B] What is the function of each of the following ... ?

1. The argon gas in the light bulb.  
.....  
2. The two pieces of lead in the base of the light bulb.  
.....

## 2. [A] Write the scientific term :

1. A type of lever in which the arm of force may be equal the arm of resistance. ( ..... )  
2. The type of levers that always conserve effort. ( ..... )



3. The material that covers the inner surface of the tube of the fluorescent lamp. ( ..... )
4. It occurs to the Moon when a part of it enters the shadow area of the Earth. ( ..... )

**[B] Give reason for each of the following :**

1. No annular lunar eclipse is formed.

.....  
 .....

2. The third class levers don't conserve effort.

.....  
 .....

**3. [A] Choose the correct answer :**

1. From the electric conductors .....  
 a. aluminium.                      b. wood.                      c. plastic.
2. From the levers that conserve effort .....  
 a. nutcracker.                      b. tweezers.                      c. coal holder.
3. When fulcrum is between effort force and resistance so the lever is ..... lever.  
 a. first                      b. second                      c. third
4. When connecting the light bulbs in parallel with many light bulbs the light intensity .....  
 a. decreases.                      b. increases.                      c. remains constant.

**[B] What happens when ... ?**

1. When the whole Moon enters the umbra (shadow) area of the Earth.  
 .....
2. If the man looks directly with the naked eye to the Sun during the solar eclipse.  
 .....

**4. [A] Put (✓) or (x) in front of the following statements :**

1. The colour of the Moon is white in the total lunar eclipse. ( )
2. The regular fires that are not resulted from electricity are extinguished by water. ( )



## Final Examinations

3. The first man who described the lever was Archimedes. ( )
4. The arm of force is shorter than the arm of resistance in the third class lever. ( )

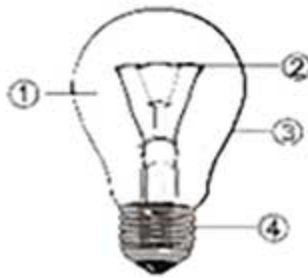
[B] A balanced first class lever was affected by an effort force 500 Newton and the arm of force 20 cm and was affected by resistance 200 Newton find the length of the resistance arm.

.....

.....

[C] Label the figure :

- ① .....
- ② .....
- ③ .....
- ④ .....



## Additional questions

[A] What happens if ... ?

1. The two guard cells of the stoma cannot change their shapes.  
.....
2. A plant is kept in dark for a long period of time.  
.....

[B] Choose the correct answer :

1. Transpiration is a vital process, where the plant is ..... water.  
a. gaining      b. absorbing      c. losing      d. (a) , (b) and (c)
2. Plant absorbs water by .....  
a. flowers.      b. root hairs.      c. stem.      d. leaves.

15

Gharbia Governorate

El-Gharbia Educational Directorate

Answer the following questions :

1. [A] Complete the following statements :

1. The ..... class levers sometimes save effort.
2. In connecting all parts of the electric circuit, it will be ..... circuit.
3. If a dark object gets in the way of light, ..... of the object is formed.
4. .... is an example of levers that is used to perform tasks accurately.



**[B] Give reasons for each of the following :**

1. The filament is the most important component in the electric lamp.  
.....
2. The effort force doesn't equal the resistance force in second class levers.  
.....

**2. [A] Write the scientific term for each of the following :**

1. The structure of the human eye which is badly affected by the solar eclipse. ( ..... )
2. The type of materials, which prevents the passage of electric current in the electric circuit. ( ..... )
3. The type of machines which are beneficial in many ways except saving effort. ( ..... )
4. The damage of body tissues resulting from direct contact with the electric current. ( ..... )

**[B] Problem :**

A long metallic bar is hanged from its midpoint. A force of 40 Newton exerted at 5 cm from midpoint. Find the weight which must be hanged at 25 cm from this point to make the bar get balanced.

.....

.....

.....

**3. [A] Choose the correct answer :**

1. Levers were first described by the Greek scientist .....  
a. Archimedes.      b. Newton.      c. Edison.      d. Galileo.
2. When the Moon enters the semi-shaded area of the Earth, ..... eclipse occurs.  
a. partial lunar      b. total lunar      c. no lunar      d. semi lunar
3. Which of the following is a component of the fluorescent lamp but not in the light bulb ? .....  
a. Argon gas.      b. Mercury vapour.      c. Water vapour.      d. Neon gas.
4. The resistance force is between the effort force and fulcrum in .....  
a. manual broom.      b. crowbar.      c. wheelbarrow.      d. fishing hook.

**[B] What happens when ... ?**

1. The Moon passes between the Earth and the Sun on one straight line.  
.....



## Final Examinations

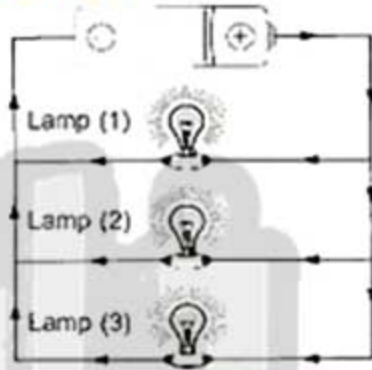
2. The force arm and the resistance arm have the same length.

## 4. [A] Correct the underlined words :

1. The scissors is used to increase the speed. (.....)
2. The Moon gets coloured blue at the beginning of the lunar eclipse. (.....)
3. The outer faint shadow of the Earth is called antumbra. (.....)
4. The lead wire carries the light bulb in upright position. (.....)

## [B] Look at the opposite figure, then complete the following :

1. The electric lamps are connected in .....
2. If one of the electric lamps in the circuit burnt, the lighting of the other lamps ..... because .....



## Additional questions

## [A] Put (✓) sign in front of correct statements and (x) sign in front of false statements :

1. The outermost layer of the plant's root is cortex. ( )
2. Endodermis layer regulates the passing of water to the xylem. ( )

## [B] Write the scientific term of the following :

1. The vital process by which green plants make their own food. (.....)
2. The energy needed for the plant to form its food. (.....)

16

Dakahlia Governorate

West Mansoura Educational Directorate

Answer the following questions :

## 1. [A] Complete the following statements :

1. The factors that determine the value of force and resistance are ..... and .....



2. Levers which make tasks perform more easily by means of ..... and .....
3. .... and ..... are two types of injuries resulting from improper use of electricity.
4. Electric current passes through the electric circuit when it is .....
5. The tube of fluorescent lamp contains inert ..... gas and little of .....
6. Solar eclipse occurs when ..... is between Sun and ..... and it has ..... types.

[B] From the opposite figure, answer the following :

1. What is the type of this lever ?  
.....
2. Does it conserve effort ?  
.....
3. Which is longer the force arm or the resistance arm ?  
.....
4. Give an example for this type of lever ?  
.....



2. [A] Write the scientific term :

1. One of the dangers of electricity is that it destroys the body tissue. ( ..... )
2. Materials which do not allow electricity to pass through. ( ..... )
3. A way used to connect electric lamps in branching routes. ( ..... )
4. The part of the human eye that is harmed when looking directly at the Sun. ( ..... )
5. The area that lies between the dark shadow area and lighted area. ( ..... )
6. Force  $\times$  Its arm = Resistance  $\times$  Its arm. ( ..... )

[B] What happen when ... ?

1. Electric lamp contains atmospheric air.  
.....
2. A part of the Moon enters the shadow area of the Earth.  
.....
3. Putting out an electric fire by using water.  
.....



## Final Examinations

## 3. [A] Put (✓) or (x) :

1. Tweezer is a type of 3<sup>rd</sup> class lever. ( )
2. The first class levers always conserve effort. ( )
3. The human body is bad conductor of electricity. ( )
4. The solar eclipse occurs at night. ( )
5. Electric overload may cause electric fires. ( )
6. The presence of wood in the electric circuit make it opened. ( )

## [B] Give reasons for :

1. The third class levers are very important although they do not conserve the effort.  
.....  
.....
2. Electric lamps are connected in parallel in the home.  
.....  
.....
3. Occurrence of total lunar eclipse.  
.....  
.....
4. The filament of light bulb is made of tungsten.  
.....  
.....

## 4. [A] Choose the correct answer :

1. Levers were described by .....  
a. Newton.                      b. Faraday.                      c. Archimedes.
2. Electric wires must be covered with .....  
a. plastic.                      b. iron.                      c. aluminium.
3. The phenomena of ..... eclipse does not occur to the Moon.  
a. partial                      b. annular                      c. total
4. The arm of resistance in the ..... class lever may be equal effort arm.  
a. first                      b. second                      c. third
5. The phenomena of lunar eclipse occurs on the ..... day of the lunar month.  
a. 5<sup>th</sup>                      b. 14<sup>th</sup>                      c. 25<sup>th</sup>



6. Electric lamp changes electric energy to .....

a. light.

b. kinetic.

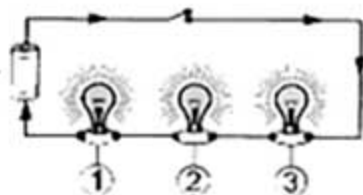
c. potential.

[B] In the opposite circuit :

1. The lamps are connected in .....

2. What happens if the switch is replaced by a metallic coin ?  
.....

3. What happens if the lamp number (2) is burnt ?  
.....



### Additional questions

[A] Give reasons for the following :

1. Plants make photosynthesis process.  
.....

2. The two guard cells change their shapes from time to time.  
.....

[B] Complete the following statements :

1. Plants lose water in the form of the water vapour through ..... process.

2. Any plant consists of root system and .....  
.....

17

Ismailia Governorate

Science Inspectorate

Answer the following questions :

1. [A] Choose the correct answer :

1. The force arm is sometimes equal to the resistance arm in the ..... class.

a. first

b. second

c. third

2. .... is considered from electric conductors.

a. Plastic

b. Iron

c. Wood

3. When the whole Moon enters the semi-shaded area of the Earth, ..... occurs.

a. solar eclipse

b. lunar eclipse

c. lunar non - eclipse



## Final Examinations

4. .... is from the second class lever.

a. Scissors

b. Nutcracker

c. Coal holder

[B] The figure represents the light bulb,  
look then write what the numbers indicate :

① .....

② .....

③ .....

④ .....



[C] Problem :

If a first class lever is affected by a force = 500 N and its arm = 20 cm.  
and the resistance force = 200 N. Calculate the resistance arm.

.....

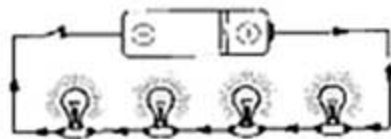
.....

.....

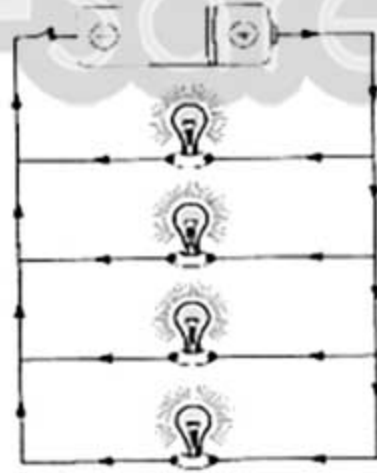
2. [A] Complete :

- The lever doesn't conserve effort when ..... arm is shorter than ..... arm.
- The fluorescent lamp contains ..... gas and a little of .....
- Scissors is considered a ..... class lever, while the fishing hook is .....

[B] The following figures represent two electric circuits (a) and (b) :



(a)



(b)

1. Mention the way in which the light bulbs are connected in each circuit.

(a) .....

(b) .....



2. Which way (a) or (b) could be used to connect the electric lamps in the house ?

3. Mention the reason.

[C] Mention the function of lever in :

1. Hockey bat.

2. Manual broom.

3. [A] Give reasons for :

1. The second class levers always conserve effort.

2. We should not look directly at the Sun with naked eye during the solar eclipse.

[B] Write the scientific term :

1. The fixed point at which the lever rotates around.

{ .....

2. One of the dangers of electricity that causes the damage of the body tissues.

{ .....

3. It occurs when the whole Moon enters the shadow area of the Earth.

{ .....

4. A rigid bar that rotates around a fixed point and affected by an effort force and a resistance force.

{ .....

[C] Notice the following figure, then answer the following questions :

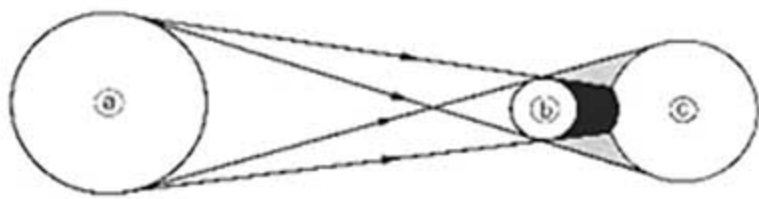
1. The figure represents an astronomical phenomenon which is .....

2. Write the labels (a,b and c) in the figure :

(a) .....

(b) .....

(c) .....





## Final Examinations

## 4. [A] What happens when ... ?

1. The force arm and resistance arm are equal.

2. Part of Moon enters the shadow area of the Earth.

## [B] Put (✓) or (x) in front of the following :

1. The first class levers has the resistance between the force and the fulcrum. ( )
2. The Moon is coloured in red at the start of total lunar eclipse. ( )
3. The soda water opener is an example of second class lever. ( )
4. Fires resulted from electricity are put out by water. ( )

## [C] Mention two of the precaution when dealing with electricity ?

1. ....
2. ....

## Additional questions

## [A] Choose the correct answer :

1. The plant makes its own food through ..... process.  
a. respiration      b. digestion      c. sensation      d. photosynthesis
2. The stoma in a plant is surrounded by ..... guard cells.  
a. two      b. three      c. four      d. five

## [B] Write the scientific term of the following :

1. Parts in the plant through plant absorbs water and mineral salt from the soil. ( ..... )
2. The energy needed for the plant to form its food. ( ..... )

18

Suez Governorate

Suez Educational Directorate

Answer the following questions :

## 1. [A] Complete the following statements :

1. In the second class levers, the resistance force is found between the ..... and .....



2. Wheelbarrow is considered a ..... class levers, while crowbar is an example of the ..... class levers.
3. The simple electric circuit consists of light bulb, electric switch, ..... and .....
4. The fluorescent lamp contains ..... gas.
5. The electric shock occurs as a result of the passing of ..... through the human body.

**[B] Put (✓) or (X) in front of the following statements :**

1. In the fluorescent lamp, the inner surface of the tube is covered with a phosphoric material. ( )
2. Fires resulted from electricity are extinguished by water. ( )
3. The two phenomena of lunar and solar eclipse are repeated regularly and can be predicted. ( )
4. In houses, electric lamps are connected in parallel. ( )

**2. [A] Write the scientific term :**

1. A fixed point on which the bar rotates around. ( )
2. A way of connecting the electric lamps, in which the light intensity decreases with the increase in their number. ( )
3. A tool used to convert electric energy to light energy. ( )
4. Materials not allowing the electric current passing through it. ( )

**[B] Give reasons for :**

1. The electric heater should not be placed too close to furniture.  
.....
2. The second class levers conserve effort.  
.....

**3. [A] Choose the correct answer :**

1. The electric wires are made of .....  
a. plastic.                      b. wood.                      c. copper.
2. All the following are types of lunar eclipse except .....  
a. annular eclipse.              b. total eclipse.              c. partial eclipse.
3. All the following are functions for levers, except .....  
a. decreasing speed.              b. increasing distance.              c. avoiding dangers.
4. If the whole Moon enters the penumbra area of the Earth, its light becomes .....  
a. clear.                      b. dark.                      c. faint.



## Final Examinations

[B] A force of 200 Newton affected a lever of the third class where its force arm was 5 cm. If the value of the resistance was 100 Newton. Calculate the length of the arm of resistance.

4. [A] Correct the underlined words :

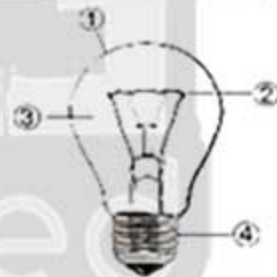
- The force arm is sometimes equal to resistance arm in the second class lever. ( ..... )
- Solar eclipse does not require precaution, warnings or special devices to look at it. ( ..... )

[B] Compare between solar eclipse and lunar eclipse :

P.O.C	Solar eclipse	Lunar eclipse
Reason :	.....	.....
Time of occurrence :	.....	.....

[C] Complete the labels :

- .....
- .....
- .....
- .....



Additional questions

[A] What is meant by ... ?

- Osmosis feature.

- Selective permeability.

[B] What happens when ... ?

The two guard cells of a stoma cannot change their shapes.



## Science Inspectorate

**Answer the following questions :**

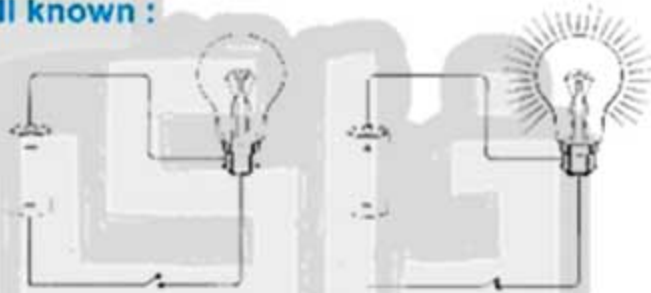
**1. [A] Choose the correct answer :**

- Duration of lunar eclipse extends for more than ..... hours.  
a. 6                                      b. 4                                      c. 2
- The filament inside the electric lamp is made of .....  
a. aluminium.                        b. tungsten.                        c. iron.
- The scissors are two levers of the ..... class lever.  
a. first                                      b. second                                      c. third
- Solar eclipse always occurs .....  
a. in the morning.                      b. at night.                                      c. at dawn.

**[B] The device which is drawn is well known :**

1. Give a name to this device.

2. What happens in case that any of the parts are not connected ?



**2. [A] Choose from column (B) which suits column (A) :**

(A)	(B)
1. Most electric machines emit 2. Coal holder is a lever used to 3. Electric lamp is prevented from air to burn its filament by 4. When a part of the Moon enters the shadow area of the Earth.	a. partial lunar eclipse occurs. b. heat. c. avoid danger. d. the glass bulb.

1. .... 2. .... 3. .... 4. ....

**[B] Write the scientific term in front of each of the following statements :**

1. Materials that allow the flow of electricity through them. ( ..... )
2. Injuries caused by electricity which are not a direct cause. ( ..... )



## Final Examinations

## 3. [A] Give reason for each of the following :

1. Most electric lamps contain argon gas inside.
- .....
- .....

2. Second class levers always conserve the effort.
- .....
- .....

## [B] Correct the underlined words in the following statements :

1. Connecting the electric lamps in the house must be in series. ( ..... )
2. Solar eclipse occurs when the Earth comes between the Moon and the Sun. ( ..... )
3. Light becomes more bright when we connect more than one bulb in series. ( ..... )
4. Fluorescent lamp contains oxygen gas inside. ( ..... )

## 4. [A] Put (✓) or (x) in front of the following :

1. Lunar eclipse causes harms to the eyes. ( )
2. We must not play with electric connections. ( )
3. Copper and iron are insulators to electricity. ( )
4. Third class levers don't conserve the effort. ( )

## [B] Complete the following statement :

Lunar eclipse can be seen in any place on the ..... and when it starts the colour of the Moon tends to be .....

## Additional questions

## [A] Write the scientific term of the following :

1. It loses water from the plant in the form of water vapour. ( ..... )
2. A system in the plant that is branched and extended through the soil to fix the plant. ( ..... )

## [B] What is the function of ... ?

Root system of the plant.

.....



Answer the following questions :

**1. [A] Complete the following statements :**

1. Lunar eclipse occurs when the Sun, Earth and ..... are one straight line and ..... in the middle.
2. When the force arm is longer than resistance arm, ..... is smaller than .....
3. In the ..... class lever the ..... is between fulcrum and the resistance.
4. Some of the types of electric lamps are ..... and .....

**[B] Give reasons for :**

1. The filament of the light bulb is made of tungsten.

2. Some levers save effort.

**2. [A] Correct the underlined words :**

1. The lever consists of fulcrum only. (.....)
2. The inner surface of the tube of the fluorescent lamp is covered with carbonic material. (.....)
3. Nutcracker is one from the first class lever. (.....)
4. Touching the naked wires that has an electric current by hand leads to electric fire. (.....)

**[B] What is the importance or uses of ... ?**

1. The inert argon gas in the light bulb.

2. Special glasses in the solar eclipse.



## Final Examinations

## 3. [A] Write the scientific term of each of the following :

1. The lever that scissors is one example. ( ..... )
2. The lunar eclipse in which the whole Moon enters the shadow area of the Earth. ( ..... )
3. Force  $\times$  Its arm = Resistance  $\times$  Its arm. ( ..... )
4. A rigid bar that rotates around a fixed points and is affected by an effort force and a resistance force. ( ..... )

## [B] What happens when ... ?

1. We remove the two point of connection of the fluorescent.  
.....
2. The resistance force is larger than the effort force.  
.....

## 4. [A] Choose the correct answer :

1. During the start of the total lunar eclipse, the colour of the Moon tends to be .....  
a. gray.                      b. yellow.                      c. orange.                      d. red.
2. Which of following used to avoid dangers .....  
a. coal holder.                      b. wheelbarrow.  
c. scissors.                      d. manual broom.
3. Which of the following gasses is found in the fluorescent lamp but not in the light bulbs ? .....  
a. Neon.                      b. Argon.  
c. Mercury vapour.                      d. Water vapour.
4. The effort force and resistance force are measured in .....  
a. Newton                      b. metre                      c. centimetre                      d. Hertz

[B] A force 400 Newton affects a first class lever and its arm of force equals 20 cm. The resistance equals 200 Newton and its arm of resistance equals 20 cm. in this example is the lever in state of balance or not and why ?

.....

.....

.....

.....



## Additional questions

[A] Put (✓) sign in front of correct statements and (x) sign in front of false statements :

1. Plant stoma is surrounded by two woody cells. ( )
2. Endodermis layer regulates the passing of water to the xylem. ( )

[B] Give reasons for the following :

The two guard cells change their shapes from time to time.

## 21 Fayoum Governorate

Science Supervision for Governmental  
Language School

Answer the following questions :

1. [A] Complete the following statements :

1. .... occurs when the .... comes between the Sun ray and a part or whole of the Moon.
2. The type of levers that always conserves effort is ....., while the type of the levers that always does not conserves effort is .....
3. The crowbar is considered a ..... class lever, but the manual broom is a ..... class lever.
4. The filament of the light bulb is made of ..... and that is because it has a high .....

[B] The arm length of a first class lever is 10 cm, and the length of the arm of the resistance is 20 cm. If the resistance has a value of 200 Newton, calculate the value of the affecting force.

2. [A] Correct the underlined words in the following statements :

1. The electric lamp converts the electric energy to the kinetic energy. ( )
2. The first class lever has the resistance between the force and the fulcrum. ( )



## Final Examinations

3. Wood is considered a good conductor to electricity. ( ..... )
4. The force is fixed point that a rigid bar sits on. ( ..... )

## [B] What happens if ... ?

1. You place the electric heater too close to furniture and rugs.  
.....  
.....

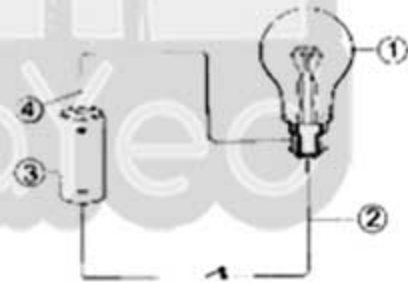
2. A part of Moon enters the shadow area of the Earth.  
.....

## 3. [A] Choose the correct answer :

1. The fluorescent lamp contains the inert ..... gas.  
a. hydrogen      b. nitrogen      c. argon      d. helium
2. .... eclipse occurs when the Moon enters the semi-shaded area only.  
In this case, the Moon light turns to be faint.  
a. No lunar      b. Partial lunar      c. Total lunar      d. Total solar
3. .... is example of materials that are electric conductors.  
a. Wood      b. Glass      c. Plastic      d. Copper
4. The electric lamps are connected in the house in .....  
a. series.      b. parallel.      c. variable.      d. (a) and (b).

## [B] Look at the following figure, then write the labels on the figure :

- ① .....  
② .....  
③ .....  
④ .....



## 4. [A] Write the scientific term for each of the following statements :

1. A rigid bar rotates around a fixed point, and is affected by a force and a resistance. ( ..... )
2. It occurs to the Moon when it completely enters the shadow area of the Earth. ( ..... )
3. One of the dangers of the electricity is causing the damage of the tissues of the body. ( ..... )
4. Levers that sometimes conserve the effort. ( ..... )



**[B] Give reasons for :**

1. The phenomenon of solar and lunar eclipse is considered an application of the umbra phenomenon.

2. There are two pieces of lead in the light bulb.

**Additional questions****[A] Rearrange the layers of the root from inside to outside.****[B] What is the function of ... ?**

1. Root hairs.
2. Endodermis layer of the plant root.

**22****El-Minia Governorate****El-Ahd El-Gdeed Language School****Answer the following questions :****1. [A] Complete the following statements :**

1. Effort force arm is measured by ..... unit.
2. Nutcracker is considered an example for ..... class lever.
3. The first scientist who made the electric lamp was .....
4. Lunar eclipse occurs ..... per year.

**[B] Problem :**

If the exerted force of the first class lever 500 N and the length of its arm is 20 cm. and is affected by a resistance with value of 200 N. Determine the location of resistance.



## Final Examinations

## 2. [A] Write scientific term :

1. A force that results from the body that we want to move. (.....)
2. A type of lever that sometimes conserves effort. (.....)
3. The source of electricity in electric circuit. (.....)
4. Astronomical phenomena occur when the Sun, Earth and the Moon in one straight line and the Moon in the middle. (.....)

## [B] 1. The opposite figure represents .....

2. Label the figure :

- ① .....
- ② .....
- ③ .....
- ④ .....



## 3. [A] Correct the underlined words :

1. The electric current has many branches when the electric lamps are connected in series connection. (.....)
2. Scissors is a third class lever. (.....)
3. Total lunar eclipse occurs when the whole of Moon enters penumbra area. (.....)
4. The filament is made of iron. (.....)

## [B] Give reasons for :

1. Third class lever always does not save effort.

.....

.....

2. We wear special glasses during solar eclipse.

.....

.....

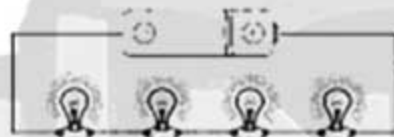
## 4. [A] Choose the correct answer

1. .... is the Moon's faint outer shadow in which the partial solar eclipse appears.  
a. Umbra                      b. Penumbra                      c. Antumbra

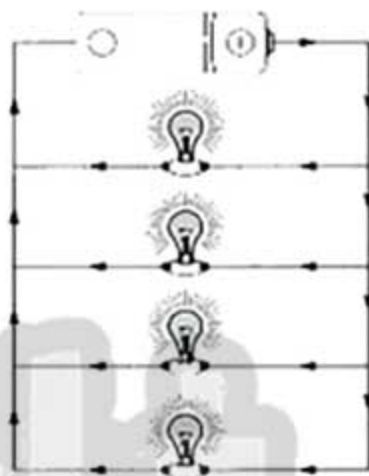


2. .... is used to prevent the air from reaching the filament.
  - a. Base of bulb
  - b. Glass bulb
  - c. Tungsten
3. Time taken by solar eclipse is ..... time taken by lunar eclipse.
  - a. equal
  - b. shorter
  - c. longer
4. In second class lever, ..... in the middle.
  - a. fulcrum
  - b. effort force
  - c. resistance force

**[B] Write the type of each connection and which of them is used to connect the electric lamps inside the house and why ?**



1. .... connection



2. .... connection

3. We use ..... inside the house, because .....

#### Additional questions

**[A] What happens if ... ?**

There is no osmosis feature in the plant.

.....

.....

**[B] Give reasons for the following :**

1. The two guard cells change their shapes from time to time.

.....

2. Plants make photosynthesis process.

.....



23

Assuit Governorate

Administration of Governmental  
Language Schools

Answer the following questions :

## 1. Complete the following statements :

- The type of levers where the arm of the force and the arm of resistance are equal is .....
- In the solar eclipse, ..... is found between the Sun and .....
- Metallic materials are considered from the electric ....., while glass and rubber are considered from the electric .....
- The manual broom is a ..... class lever.

## 2. [A] Put (✓) or (x) in front of each statement and correct the wrong one :

- The fulcrum in scissors lies between force and resistance. ( )  
.....
- The spiral base of the light bulb glows due to passing the electric current through it. ( )  
.....
- If the force arm is smaller than the resistance arm, the lever saves effort. ( )  
.....
- Lunar eclipse occurs in the end of lunar month. ( )  
.....
- Human body is a good conductor of electricity. ( )  
.....

## [B] What happens when ... ?

- Putting off the electric fires with water.  
.....
- The light bulb in the house are connected in series.  
.....

## 3. [A] Write the scientific term :

- Way used to connect electric lamps in branching routes. ( )
- It occurs when part of the Moon enters the shadow area of Earth ( )



3. One of the dangers of the electricity is that it destroys the tissue of the body. (.....)

4. Type of levers doesn't save effort. (.....)

**[B] Give reasons for :**

1. We should not look at the Sun by the naked eye.

.....  
.....

2. Sometimes the first class lever saves effort.

.....

**4. [A] Look at the opposite figure, then answer :**

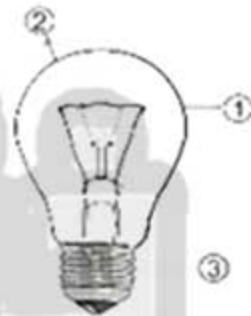
1. This device is .....

2. Label the figure :

① .....

② .....

③ .....



**[B] A force of 50 Newton affected a lever of the 2<sup>nd</sup> class its force arm 20 cm. Calculate the resistance given that the arm of the resistance = 5 cm.**

.....  
.....

**Additional questions**

**[A] Complete the following statements :**

1. Plants absorb water and mineral salts from the soil by ..... in their roots.

2. The ..... are small openings that are widely spread on the ..... surface of plant leaves.

**[B] Give reasons for the following :**

Plants make photosynthesis process.

.....



24

Sohag Governorate

Science Inspectorate

Answer the following questions :

## 1. [A] Complete the following statements :

1. In first class levers, the fulcrum is found between ..... and .....
2. The crowbar is an example of the ..... class levers.
3. The law of levers states that .....
4. The fluorescent lamp contains ..... gas.

[B] A force of the first class lever equals 500 Newton and its force arm 20 cm calculate the resistance arm given that the resistance is 200 Newton.

.....

.....

## 2. [A] Put (✓) or (x) in front of each statement and correct the wrong one :

1. Electric shock occurs as a result of passage of the electric current to the human body. ( )
2. Connecting electric lamps in the house is in series. ( )
3. Although the two phenomena of lunar and solar eclipses attract people's attention, they do not affect life on Earth. ( )
4. If the injured with an electric shock can't breathe start immediately artificial respiration. ( )

[B] What happens if ... ?

The light bulbs in the house are connected in series.

.....

.....

[C] Mention precautions in dealing with electricity (two only).

.....

.....

## 3. [A] Write the scientific term in each of the following :

1. The fixed point at which the lever rotates. ( )



2. A tool used to convert the electric energy into light energy. ( ..... )
3. Type of levers doesn't save effort. ( ..... )
4. The substances that allow the electric current to pass through them. ( ..... )
5. It occurs when a part of the Moon enters the shadow area of the Earth ( ..... )
6. The way where the bulbs are connected by branching routes. ( ..... )

**[B] Give reasons for the following :**

1. The second class levers save effort.  
.....  
.....
2. We shouldn't look directly at the Sun with naked eye during the solar eclipse.  
.....  
.....
3. Decorative lamps are connected in parallel not in series.  
.....

**4. [A] Choose the correct answer :**

1. Force arm is sometimes equal to resistance arm in ..... class levers.  
a. first                      b. second                      c. third
2. From the examples of good electric conductors substances is .....  
a. wood.                      b. plastic.                      c. copper.
3. .... is considered from the third class levers.  
a. Fishing hook                      b. Seesaw                      c. Nutcracker

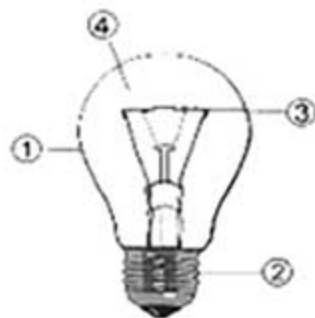
**[B] Compare between solar and lunar eclipse (terms to the duration).**

Solar eclipse : .....

Lunar eclipse : .....

**[C] Look at the following figure, and then write the labels on the figure :**

- ① .....
- ② .....
- ③ .....
- ④ .....





## Additional questions

## [A] Write the scientific term of the following :

1. A system in the plant that is branched and extended through the soil to fix the plant. ( ..... )
2. It loses water from the plant in the form of water vapour. ( ..... )

## [B] Give reasons for the following :

Plants make photosynthesis process.

.....

## 25 South Sinai Governorate

## Science Inspectorate

Answer the following questions :

## 1. [A] Complete the following statements :

1. In the third class levers, the ..... lies between ..... and fulcrum.
2. From electric insulators ..... and .....
3. From the components of the electric circuit electric wires, switch and .....
4. Solar eclipse occurs when ..... lies between the ..... and the Sun on the same straight line.
5. The ..... from electric dangers that causes damage of the human body tissues.
6. Sweet holder is an example of ..... levers.

## [B] Give reasons for :

1. We cannot use water in putting out electric fires.  
.....
2. Some levers are important to man although they don't save effort.  
.....

## 2. [A] Choose the correct answer :

1. .... is from a second class levers.  
a. Scissors                      b. Wheelbarrow                      c. Manual broom



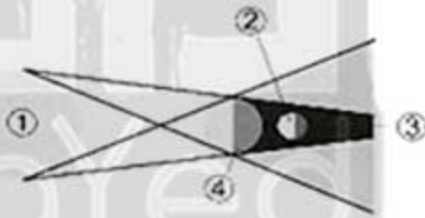
2. When a lamp is connecting in parallel with several other lamps, the light intensity of the lamps .....
  - a. decrease.
  - b. increase.
  - c. remains as it is.
3. From electric conductors .....
  - a. wood.
  - b. rubber.
  - c. iron.
4. .... is an example of first class levers.
  - a. Crowbar
  - b. Bottle opener
  - c. Manual broom
5. In electric lamp the electric energy changes into ..... energy.
  - a. kinetic
  - b. light
  - c. sound
6. The time taken by the solar eclipse ..... the time taken by the lunar eclipse.
  - a. less than
  - b. more than
  - c. equal

[B] Mention some of the important precautions when dealing with electricity.

1. ....
2. ....

[C] The opposite figure represents lunar eclipse phenomenon, observe it, then label the figure.

- ① .....
- ② .....
- ③ .....
- ④ .....



3. [A] Put (✓) or (x), then correct the wrong one :

1. The electric lamp contains mercury vapour. ( )
2. Bottle opener is a third class lever. ( )
3. Lunar eclipse doesn't require precautions or special devices to observe. ( )
4. Scissors from first class levers. ( )



## Final Examinations

5. If the force arm longer than the resistance arm so the force more than the resistance and the lever saves effort. ( )
6. In the second class levers the force arm may be equal to the resistance. ( )

## [B] Compare between :

Total lunar eclipse	Partial lunar eclipse

## [C] Join from column (A) with the suitable in column (B) :

(A)	(B)
1. Fishing tool	a. connect the electric current.
2. Seesaw	b. source of the electric current.
3. Nutcracker	c. sometimes saves effort.
4. Two pieces of lead in the base of the light bulb	d. always save effort.
	e. always don't save effort.
1. ....	3. ....
2. ....	4. ....

## 4. [A] Write the scientific term :

1. Levers at which the resistance lies between force and fulcrum. ( )
2. A coiled thin wire made of tungsten in the light bulb. ( )
3. A way in which the light bulbs are connected one after another, where the light intensity of the bulbs decreases by increasing their numbers. ( )
4. The fixed point of a rigid bar on which the bar rotates. ( )
5. One of the dangers of electricity occurs as a result of passage of electric current through the human body. ( )
6. Levers at which the fulcrum lies between force and resistance. ( )



[B] In a lever if the length of the force arm = 4 cm, the length of the resistance force = 6 cm , and the value of the force = 48 N. Calculate the value of the resistance.

.....

.....

[C] What happens if ... ?

1. The electric lamps in decorative lights are connected in series not parallel.  
.....
2. The whole Moon enters the semi-shaded area of the Earth.  
.....
3. The electric lamps contain atmospheric air.  
.....
4. You place the electric heater too close to furniture and rugs.  
.....

#### Additional questions

[A] Put (✓) sign in front of correct statements and (x) sign in front of false statements :

1. Root hairs extend from the cells of the endodermis layer. ( )
2. Water rises inside the plant stem through the wood tissue. ( )

[B] What happens if ... ?

1. A plant is kept in dark for a long period of time.  
.....
2. Absence of cell membrane of the root hairs.  
.....  
.....



PART

1

## Guide Answers of The Main Book



هذا العمل خاص بموقع ذاكرولي التعليمي ولا يسمح بتداوله على مواقع أخرى



## Unit One

## Lesson 1

1. a. levers. 2. b. fulcrum.  
3. a. Archimedes. 4. a. Lever  
5. b. effort 6. d. (a), (b) and (c).  
7. c. increasing size. 8. a. Crowbar  
9. c. Hockey bat  
10. c. pick up very small objects.  
11. a. Coal holder. 12. c. The broom.  
13. c. Manual broom. 14. a. first class  
15. a. first class levers. 16. c. scissors.  
17. c. Second class levers  
18. b. second class lever.  
19. c. the position of fulcrum.  
20. c.



21. a. Nutcracker, wheelbarrow and bottle opener  
22. b. Wheelbarrow.  
23. a. Third class levers  
24. c. sweet holder. 25. a. Sweet holder  
26. c. wheelbarrow. 27. b. second  
28. c. nutcrackers. 29. a. first

2. 1. d 2. f 3. c 4. e 5. b 6. a

3. 1. (✓) 2. (x) ... fulcrum.  
3. (x) ... an effort force and fulcrum.  
4. (✓) 5. (✓) 6. (✓)  
7. (✓) 8. (x) Tweezers are ....  
9. (✓)  
10. (x) In the second class ....  
11. (✓)  
12. (x) ... increase the distance.  
13. (x) ... Increase the speed.  
14. (✓) 15. (✓) 16. (✓)  
17. (x) The first class levers ...  
18. (x) ... two first class levers. 19. (✓)  
20. (x) The first class levers ....  
21. (x) ... and wheelbarrow are examples of second class levers.  
22. (x) ... so it is a third class lever.

23. (x) The third class levers ...  
24. (x) The fulcrum of the first class lever is ...  
25. (x) ... second class lever.  
26. (x) ... is a third class lever.

4. 1. Fulcrum. 2. Lever.  
3. Resistance force. 4. Effort force.  
5. First class levers. 6. First class levers.  
7. Second class levers. 8. Third class levers.  
9. Third class levers. 10. First class levers.

5. 1. lever. 2. Lever  
3. Archimedes. 4. rigid bar  
5. an effort force - a resistance force.  
6. a fulcrum - resistance force - an effort force.  
7. Resistance force 8. Effort force  
9. fulcrum.  
10. increasing force - increasing distance - increasing speed.  
11. Moving the force from one place to another - increasing speed - accuracy in performance  
12. Crowbar - nutcracker  
13. Crowbar - manual broom  
14. Hockey bat 15. Manual broom  
16. Tweezers 17. Coal holder  
18. Crowbar - nutcracker  
19. Coal - ice  
20. first - second - third class levers.  
21. First class lever 22. Scissors - scissors  
23. first - stapler  
24. effort force - fulcrum.  
25. Soda water opener - nutcracker  
26. effort force - resistance force.  
27. resistance force - effort force.  
28. fishing tool - hockey bat  
29. the third class levers.  
30. second class 31. third class  
32. first class 33. first - second  
34. third class  
35. first - third 36. third - effort force

6. 1. levers. 2. fulcrum.  
3. fulcrum, effort force and resistance force.  
4. Effort force 5. hockey bat.  
6. avoiding dangers. 7. first class levers.  
8. paddle 9. second  
10. third 11. first  
12. first 13. second  
14. third 15. first



## Answers of the Main Book

7. 1. Because it consists of a rigid bar that rotates around a fixed point called fulcrum, and is affected by an effort force and a resistance force.  
 2. Because in some levers, we use a small force to make a great effort.  
 3. Because in the nutcracker we use a small force to make a great effort.  
 4. Because your hand moves a small distance at the upper part of the broom, while its lower part moves a longer distance.  
 5. To pick up very small objects.  
 6. Because they are used in :  
 - Increasing force. - Increasing speed.  
 - Increasing distance.  
 - Moving force from one place to another.  
 - Picking up the very small objects.  
 - Avoiding dangers  
 7. Because they have fulcrum between the effort force and the resistance force.  
 8. Because they have the resistance force between the fulcrum and the effort force.  
 9. Because they have the effort force between the resistance force and fulcrum.  
 10. Because wheel barrow has the resistance force between effort force and fulcrum, while shovel has the effort force between the resistance force and fulcrum.

8. Pincers - Seesaw - Nail clippers - Fiddle - Scissors - Hammer claw.

9. 1. It is a rigid bar that rotates around a fixed point called fulcrum, and is affected by an effort force and a resistance force.  
 2. It is a force that is exerted by a person to equilibrate the resistance.  
 3. It is a fixed point, where the bar rotates around.  
 4. They are levers that have the fulcrum between the resistance force and effort force.  
 5. They are levers that have the resistance force (R) between the effort force (E) and fulcrum (O).  
 6. They are levers that have the effort force between the resistance force and fulcrum.

10. 1. Coal holder. 2. Hockey bat.  
 3. Crowbar. 4. Manual broom.  
 5. Manual broom. 6. Tweezers.

First class levers	Second class levers	Third class levers
(4)	(1) (3) (5)	(2) (6)

12. 1. Determine the position of effort force, resistance force and fulcrum.  
 2. Identify the middle position of the lever.

13. Look at the main book on page (15).

14. Many tasks can't be performed easily as holding the very hot objects as coal.

15. (1) Effort force. (2) Seesaw.  
 (3) The resistance force is between the effort force and fulcrum.  
 (4) Effort force.  
 (5) Wheelbarrow.  
 (6) The effort force is between the force of resistance and fulcrum.  
 (7) Fulcrum. (8) Hockey bat.

## Times Questions

1. h. (Effort force → Fulcrum → Resistance force) - - Pincers  
 2. h. B  
 3. c. Bottle opener and stapler.  
 4. d. Statement is right while the example is wrong.  
 5. (1) - (A) is fulcrum. - (B) is resistance.  
 - (C) is effort force.  
 - a second class lever.  
 (2) - (A) is effort force. - (B) is fulcrum.  
 - (C) is resistance.  
 - a third class lever.  
 (3) - (A) is resistance. - (B) is effort force.  
 - (C) is fulcrum.  
 - a first class lever.



## Lesson 2

1. 1. a. force  $\times$  its arm = resistance  $\times$  its arm.

2. d. (a) and (b).

3. c. the effort force arm.

4. b. the arm of resistance.

5. b. smaller than 8. c. =

7. d. (a) and (c)

8. a. the effort force = the resistance force.

9. d. (b) and (c). 10. a. Newton.

11. a. first

12. a. first class levers.

13. b. third class levers.

14. h. second class levers.

15. d. (a), (b) and (c). 16. b. Nutcracker.

17. d. (a), (b) and (c). 18. a. Coal holder.

19. c. Sixta water opener.

20. a. nutcracker.

2. 1. c 2. a 3. b 4. e 5. f 6. d

3. 1. {✓} 2. {✓}

3. {x} ... doesn't conserve effort.

4. {x} ... doesn't save effort.

5. {x} ... conserves effort.

6. {x} ... doesn't conserve effort.

7. {x} ... Newton. 8. {✓}

9. {✓} 10. {✓}

11. {x} In the second class levers.

12. {✓} 13. {✓}

14. {x} In the 1<sup>st</sup> class levers, ...

15. {x} ... haven't ... 16. {✓}

17. {x} ... is longer than ...

18. {x} ... is larger than ...

19. {x} The second class levers ...

4. 1. The effort force arm.

2. The resistance arm.

3. Law of levers.

4. The effort force.

5. The resistance force.

6. The second class levers.

7. The first class levers.

8. The third class levers.

9. The first class levers.

10. The second class levers.

11. The third class levers.

12. The second class levers.

13. The first class levers.

14. The third class levers.

15. The second class levers.

5. 1. the effort force  $\times$  its arm  
= the resistance force  $\times$  its arm.

2. the effort force - fulcrum.

3. the resistance arm.

4. resistance - its arm.

5. the force arm - the resistance arm.

6. the effort force - resistance force.

7. effort force - resistance force.

8. Newton.

9. metre or centimetre.

10. effort force - the resistance force.

11. effort.

12. the resistance arm - the effort arm.

13. the force arm equals the resistance arm.

14. the effort force - the resistance

15. the effort force - the resistance

16. first class levers.

17. the force arm - the resistance arm.

18. the second class levers - the third class levers.

19. mechanical - the resistance arm - equal.

20. smaller than

21. doesn't conserve

22. the effort force arm - the resistance arm.

23. second class - third class

24. a second

25. force arm - the resistance arm.

26. the force arm - the resistance arm.

27. The third class

28. longer - smaller

29. 2 Newton.

30. 10 cm.

6. 1. Because the effort force is larger than the resistance according to the law of levers.

2. Because the effort force equals the resistance according to the law of levers.

3. Because the effort force is smaller than the resistance according to the law of levers.



## Answers of the Main Book

4. Because in the crowbar, the effort force is smaller than the resistance.
5. Because in the first class levers only, the effort arm may be equal to the resistance arm.
6. Because sometimes in the 1<sup>st</sup> class levers, the force arm is longer than the resistance arm.
7. Because the effort arm is always longer than the resistance arm, so the effort force is smaller than the resistance.
8. Because it is a second class lever where the effort arm is longer than the resistance arm.
9. Because in the second class lever, the effort arm is always longer than the resistance arm.
10. Because the effort arm is always shorter than the resistance arm, so the effort force is always larger than the resistance.
11. Because they are second class levers, where the resistance force is larger than the effort force.
12. Because the effort force arm is always longer than the resistance arm.
13. Because the effort force arm is longer than the resistance arm.
14. Because they are important in other things as :
  - Increasing distance.
  - Increasing speed.
  - Avoid dangers.
  - Accuracy in performance.
15. Because in the crowbar, the effort force is always larger than the resistance force.

7. 1. The effort force  $\times$  its arm = the resistance  $\times$  its arm.  
2. It is the distance between the effort force and fulcrum.  
3. It is the distance between the resistance and fulcrum.

8. 1. fulcrum. 2. its arm  
3. larger 4. equal to  
5. first class levers. 6. second  
7. third 8. 7 Newton.  
9. second 10. smaller

11. shorter
13. first

12. first

9. 1. The effort force and the resistance force are equal and this lever doesn't conserve effort.  
2. The effort force is smaller than the resistance force and this lever conserves effort.  
3. The lever doesn't conserve effort.  
4. The effort force is larger than the resistance force and the lever doesn't conserve effort.  
5. The lever saves effort.  
6. The lever doesn't conserve effort.  
7. The effort force equals the resistance force and this lever doesn't conserve effort.  
8. The effort force is double the resistance force and this lever doesn't conserve effort.

10.

Points of comparison	First class lever	Second class lever	Third class lever
• Definition :	It is a lever that has fulcrum between the effort force and resistance.	It is a lever that has resistance between the fulcrum and the effort force.	It is a lever that has the effort force between fulcrum and resistance.
• Importance :	Some of them save effort, but the others don't, so they used to avoid dangers, increasing speed, ...	It conserves effort.	It is used in : - Increasing speed. - Increasing distance. - Avoiding dangers. - Accuracy in performance.
• Conservation of effort :	Some of them conserve effort, but the others don't.	It always conserves effort.	It doesn't conserve effort.
• Examples :	Scissors, crowbar, pliers, nail clippers and pincers.	Whisketrow, stapler, soda water opener and nutcracker.	Manual brush, hockey bat, tweezers and dental holder.



11. 1. (i) - Force  $\times$  its arm = Resistance  $\times$  its arm

$$(a) \times 3 = 300 \times 2$$

$$(a) = \frac{300 \times 2}{3} = 200 \text{ Newton}$$

$$(ii) - 500 \times (b) = 400 \times 2.5$$

$$(b) = \frac{400 \times 2.5}{500} = 2 \text{ metre}$$

$$(iii) - 300 \times 3 = (c) \times 3$$

$$(c) = \frac{300 \times 3}{3} = 300 \text{ Newton}$$

$$(iv) - 40 \times 5 = 25 \times (d)$$

$$(d) = \frac{40 \times 5}{25} = 8 \text{ metre}$$

$$(v) - (e) \times 4 = 20 \times 1$$

$$(e) = \frac{20 \times 1}{4} = 5 \text{ Newton}$$

2. - Cases (i) and (iii) save effort, because the effort force is smaller than the resistance.

- Cases (ii), (iv) and (v) don't save effort, because the effort force is larger than or equal to the resistance.

12. 1. Effort force  $\times$  its arm = Resistance  $\times$  its arm

$$150 \times \text{its arm} = 250 \times 3$$

$$\text{Effort arm} = \frac{250 \times 3}{150} = 5 \text{ metre}$$

2. Effort force  $\times$  its arm = Resistance  $\times$  its arm

$$40 \times 5 = \text{resistance} \times 25$$

$$\text{Resistance} = \frac{40 \times 5}{25} = 8 \text{ Newton}$$

3. - Effort force  $\times$  its arm = Resistance  $\times$  its arm

$$\text{Effort force} \times 100 = 400 \times 15$$

$$\text{Effort force} = 60 \text{ Newton}$$

- The type of lever is a first class lever.

4. Effort force  $\times$  its arm = Resistance  $\times$  its arm

$$500 \times 20 = 200 \times \text{its arm}$$

$$\text{Arm of resistance} = \frac{500 \times 20}{200} = 50 \text{ cm}$$

5. Effort force  $\times$  its arm = Resistance  $\times$  its arm

$$\text{Effort force} \times 5 = 300 \times 15$$

$$\text{Effort (affecting) force} = \frac{300 \times 15}{5}$$

$$= 900 \text{ Newton}$$

6. Effort (affecting) force  $\times$  its arm =

$$\text{Resistance} \times \text{its arm}$$

$$200 \times 50 = 1000 \times \text{its arm}$$

$$\text{Arm of resistance} = \frac{200 \times 50}{1000} = 10 \text{ cm}$$

7. Effort force  $\times$  its arm = Resistance  $\times$  its arm

$$100 \times 25 = 500 \times \text{its arm}$$

$$\text{The resistance arm} = \frac{100 \times 25}{500} = 5 \text{ cm}$$

8. Effort force  $\times$  its arm = Resistance  $\times$  its arm

$$200 \times 5 = 100 \times \text{its arm}$$

$$\text{Arm of resistance} = \frac{200 \times 5}{100} = 10 \text{ cm}$$

9. - Effort force  $\times$  its arm = Resistance  $\times$  its arm

$$500 \times 10 = 200 \times 20$$

$$5000 \neq 4000$$

So, this lever isn't in balance state, because the result of effort force  $\times$  its arm is not equal to the result of resistance  $\times$  its arm.

10. - Effort force  $\times$  its arm = Resistance  $\times$  its arm

$$\text{Effort force} \times 0 = 12 \times 2$$

$$\text{Effort force} = \frac{12 \times 2}{0} = 3 \text{ Newton}$$

- The type of lever is a second class lever, because the effort force is smaller than the resistance.

11. Effort force  $\times$  its arm = Resistance  $\times$  its arm

$$500 \times 20 = \text{resistance} \times 50$$

$$\text{resistance} = \frac{500 \times 20}{50} = 200 \text{ Newton}$$

12. (1) Effort force  $\times$  its arm = Resistance  $\times$  its arm

$$480 \times 40 = \text{Resistance} \times 60$$

$$\text{Resistance} = \frac{480 \times 40}{60} = 320 \text{ Newton}$$

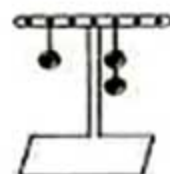
(2) doesn't save - first - third

## 13. In fig. (a), the resistance = 1 weight

, the resistance arm = 2 cm.

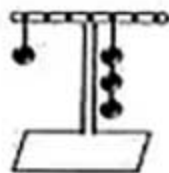
and effort arm = 1 cm.

, So the effort force =  $\frac{2 \times 1}{1} = 2$  weights.





In fig. (b), the resistance = 1 weight,  
the resistance arm = 3 cm.  
and the effort force = 1 cm.  
∴ So the effort force =  $\frac{1 \times 3}{1} = 3$  weights.



14. (1) Second class lever.  
(2) Effort force  $\times$  its arm = Resistance  $\times$  its arm  
 $200 \times 50 = 500 \times \text{resistance arm}$   
 $\text{Resistance arm} = \frac{200 \times 50}{500}$   
 $= 20 \text{ cm.}$
15. Effort force  $\times$  its arm = Resistance  $\times$  its arm  
 $10 \times 6 = \text{resistance} \times 2$   
Resistance (the weight of the rock)  
 $= \frac{10 \times 6}{2} = 30 \text{ Newton.}$

- 13.** Fig. (a), because the effort arm is longer than the resistance arm, so the effort force is smaller than the resistance.

- 14.** (1) Third class lever don't save effort, because the resistance arm is always longer than the force arm, so effort force is larger than resistance force.
- (2) First class lever may be save or not save according to the effort arm and resistance arm.
- (3) Second class lever save effort, as effort force is smaller than resistance force.

- 15.** (1) May conserve effort.  
(2) May not conserve effort.  
(3) Don't conserve effort.

### Times Questions

1. b
2. c. equal to the weight of pupil (A).
3. b. more than 5.
4. Mark - Ahmed

## Unit Two

## Lesson 1

1. 1. d. (a) and (b)
2. d. (a), (b) and (c).
3. h. light
4. c. two points of connection.
5. a. tungsten.
6. c. high melting point.
7. c. Copper and lead wires in the light lamp
8. c. two thick copper wires.
9. c. Mercury vapour.
10. c. Argon gas and a little of mercury vapour.
11. b. a phosphoric material.
12. b. to connect the lamp to electricity.
13. c. doesn't change.
14. a. atmospheric air.
15. c. (a), (b) and (c).
16. a. decreases.
17. c. does not change.
18. b. in parallel.
19. d. all lamps will be turned off.
20. c. all lamps turn off.
21. a. lamps and all other electric machines are connected in parallel.
22. a. parallel
23. a. lamps are connected in parallel.

- 2.**
- |      |      |      |
|------|------|------|
| 1. c | 2. b | 3. e |
|------|------|------|
- 
- 3.**
1. (✓)
  2. (x) .... while the Sun is a natural light source.
  3. (x) .... electric energy into light energy.
  4. (x) .... artificial light.
  5. (x) .... through tungsten filament.
  6. (✓)
  7. (x) .... argon gas.
  8. (x) .... contains argon gas.
  9. (x) .... tungsten.
  10. (x) .... has high melting point.
  11. (✓)
  12. (✓)
  13. (x) Two side nails base ....
  14. (x) The tungsten filament ....
  15. (x) .... two filaments ....
  16. (x) .... argon gas and a little amount of mercury vapour.
  17. (✓)



18. (x) .... but it contains inert gas called argon gas.

19. (✓)

20. (x) Electric lamp, a battery and connecting wires ....

21. (✓)

22. (x) In series electric circuit, ....

23. (x) ... the other lamps turn off.

24. (x) ... doesn't change by increasing ....

25. (x) ... in series, ....

26. (✓)

4. 1. Electric lamp. 2. The Sun.  
3. Thomas Alpha Edison.  
4. The filament.  
5. Tungsten filament.  
6. Glass bulb. 7. Argon gas.  
8. The base of the light bulb.  
9. Tungsten.  
10. Phosphoric material.  
11. Fluorescent lamps.  
12. Fluorescent lamp.  
13. Electric circuit.  
14. Simple electric circuit.  
15. Series connection.  
16. Series connection.  
17. Parallel connection.  
18. Parallel connection.

5. 1. Sun  
2. Thomas Alpha Edison  
3. Candles - oil lamps  
4. Electric lamp  
5. electric - light  
6. the electric current  
7. light bulbs - fluorescent lamps.  
8. lighting houses - torches.  
9. the tungsten filament - glass bulb - the base of the light bulb.  
10. tungsten - melting point.  
11. argon  
12. argon - air.  
13. the base of the lamp - the tungsten filament.  
14. spiral - two side nails

15. argon

16. Spiral - two side nails

17. Fluorescent

18. a glass tube - two filaments of tungsten - points of connection.

19. argon - mercury vapour. 20. phosphoric

21. a battery - lamp - electric wires.

22. closed

23. Series connection - parallel connection

24. decreases. . . . .

25. parallel. 26. series - parallel

27. series - increasing

28. parallel

6. 1. light 2. artificial  
3. Thomas Alpha Edison 4. tungsten.  
5. argon 6. base  
7. argon 8. high  
9. fluorescent lamp. 10. phosphoric  
11. electric wires 12. closed  
13. series 14. in parallel  
15. is one route 16. decreases.  
17. in parallel. 18. in parallel.

7. 1. Because it has high melting point that prevents the melting of the filament at high temperatures.  
2. To protect the filament from burning so the lifetime of the filament increases.  
3. Because it heats up and emits light when the electric current passes through it.  
4. To transfer the electric current from the base of the lamp to the tungsten filament.  
5. Because metals are good conductors of electricity.  
6. To connect the lamp to the electric circuit.  
7. Because they are used in many purposes as:  
- Lighting houses and offices.  
- Decorating commercial stores.  
- Commercial advertisements.  
8. To protect the two filaments of tungsten from burning and to increase their lifetime.  
9. To connect the fluorescent lamp to the electricity.  
10. To prevent turning off all the lamps of the house when one lamp is damaged or turned off.



## Answers of the Main Book

11. Because the lamps of the decorative lights are connected in parallel.  
12. To prevent turning off all the lamps when one or more lamps burn out.

8. 1. The air will reach the filament causing its burning when it heats up.  
2. The filament will burn when it heats up.  
3. The tungsten filament will burn when it heats up.  
4. The filament will melt at the high temperatures.  
5. The light bulb can't be connected to the electricity.  
6. There is no electric current in this electric circuit as the battery is the main source of electric current.  
7. The electric current does not pass through the electric circuit.  
8. The light intensity of the lamps will decrease by increasing the number of the connected light bulbs.  
9. The light intensity of the lamps will not be affected by increasing the number of the connected light bulbs.  
10. The other lamps in the electric circuit will be turned off.  
11. The other lamps in the electric circuit will not be affected and keep lighting.  
12. When one of the lamps is damaged or turned off, all the other lamps in the house will turn off.  
13. The tungsten filament heats up and emits light.

9. 1. It is a tool that converts electric energy into light energy.  
2. It is a closed and continuous path through which the electric current will pass making a complete cycle.

10. 1. It heats up and emits light when the electric current passes through it.  
2. It connects the lamp to the electric circuit and carries the lamp in upright position.

3. They allow the electric current to pass from the base of the lamp to the filament.  
4. It protects the filament from burning and increases the lifetime of the filament.  
5. They connect the fluorescent lamp to the electric circuits.  
6. It is the source of electric current in the electric circuit.  
7. It is used in :  
a. lighting houses and offices.  
b. decorating commercial stores.  
c. commercial advertisements.

## 11. 1.

Points of comparison	Series connection	Parallel connection
1. Light intensity :	Decreases by increasing the number of lamps.	Remains constant by increasing or decreasing the number of lamps.
2. Removing one of the lamps from the connection :	The other light bulbs are turned off.	The other light bulbs are lighted up with the same intensity.

## 2.

Point of comparison	Light bulb	Fluorescent lamp
Structure :	It consists of : - One filament of tungsten. - Glass bulb. - Base of the light bulb.	It consists of : - Glass tube. - Two filaments of tungsten. - Points of connection.

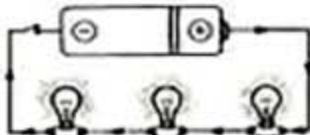
## 3.

Point of comparison	Natural light sources	Artificial light sources
Examples :	The Sun.	Candles, oil lamps and electric lamps.

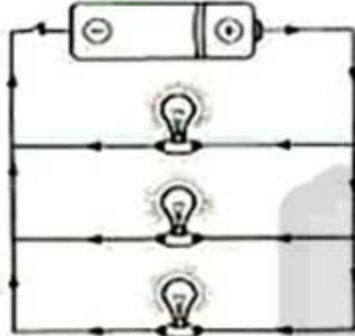
12. 1. b. parallel. 2. a. will continue.



13.1.



2.



14. 1. (A) represents the series connection, but (B) represents the parallel connection.  
2. The way (B), because in parallel connection, when one of the lamps burns out, the other lamps are still lighting.

15. (A) The light bulb.

- (B) ① Tungsten filament.  
② Argon gas.  
③ Glass bulb.  
④ The base of the bulb.  
⑤ A piece of lead.  
⑥ Copper and lead wires.

(C) Because argon gas protects the filament from burning and increases the lifetime of the filament.

16. ① Tungsten filament.  
② A glass tube.  
③ Points of connection.

17. 1. closed  
2. electric current  
3. ① Negative pole.  
② Positive pole.  
③ Battery.  
④ Electric wire.  
⑤ Electric bulb.  
⑥ Switch.  
4. a. closed

## Times Questions

1. c. bulb 3 only lights.
2. c. column (B) is structure of fluorescent lamp and column (C) is structure of electric circuit.
3. [No] because in series connection light intensity decreases by increasing the number of lamps.
4. Fig. (a)      2. Fig. (b)      3. Fig. (c)
5. To let the bell makes a sound we must connect the two wires A and B together (a closed circuit), so the electric current passes through the circuit and the bell makes a sound.

6.



## Lesson 2

1. 1. d. (a), (b) and (c).  
2. b. Iron      3. c. rubber.  
4. d. copper.      5. d. Plastic  
6. c. electric insulators.  
7. a. electric conductors.  
8. d. (a), (b) and (c).  
9. b. falling from the top of a ladder.  
10. c. electric fires.      11. d. (a), (b) and (c).  
12. a. it is a good conductor of electricity.  
13. a. Electric shock      14. d. (a) and (b).  
15. c. electric burns.      16. d. (a) and (c).  
17. d. (a), (b) and (c).  
18. c. Don't clean any electric machine, while being connected to the electricity.  
19. d. copper.      20. b. plastic.
2. 1. (✓)  
2. (x) Iron is ...      3. (✓)  
4. (x) Iron and copper ...  
5. (x) ... doesn't pass.  
6. (x) Electric conductors ...  
7. (✓)      8. (✓)



## Answers of the Main Book

9. (x) ... conductor.  
 10. (x) ... electric shock.  
 11. (x) There is danger ...  
 12. (x) ... by sand.  
 13. (✓) 14. (✓)  
 15. (x) ... depend on the time ... and the strength of the electric current.  
 16. (x) ... electric burns.  
 17. (✓) 18. (✓)  
 19. (x) Electric burns ...

3. 1. Electric conductors.  
 2. Electric Insulators.  
 3. Electric energy.  
 4. Electric fires. 5. Electric fires.  
 6. Water. 7. Sand.  
 8. Electric fire 9. Electric shock.  
 10. Electric shock. 11. Electric burns.
4. 1. houses - factories.  
 2. radio - television - washing machine.  
 3. electric conductors - electric insulators.  
 4. electric conductors.  
 5. Copper - aluminium  
 6. conductor - insulator.  
 7. electric insulators.  
 8. Rubber - clothes - plastic  
 9. conductors - insulators.  
 10. direct injuries - indirect injuries.  
 11. Electric fires - electric shock - electric burns  
 12. Electric burns - electric fires  
 13. electric fires. 14. electric fires.  
 15. electric overload - electric fire.  
 16. Placing flammable materials near to an electric machine that generates heat - plugging more than one machine to one electric socket - not disconnecting machines that generate heat after using them  
 17. electric fire. 18. electricity.  
 19. regular - sand.  
 20. a good conductor of electricity.  
 21. Electric shock  
 22. the electric current  
 23. the strength of the electric current passing through the human body - the time taken by the electric current to pass.  
 24. Electric shock

25. damage of the body tissues.  
 26. Your body touches directly a source of an electric current - your body touches an electric machine that generates heat  
 27. Don't insert a metallic object in the socket - don't place many connections in the same socket  
 28. wet 29. naked (uncovered)  
 30. plastic  
 31. curtains - heat - electric heater  
 32. insulating

5. 1. Because we use it:  
 - To cook food and preserve it cold.  
 - To light our houses, factories ...  
 - In operating some machines as washing machines, radios and televisions.  
 2. Because iron is an electric conductor which allow electricity to pass through it.  
 3. Because wood is an electric insulator which does not allow electricity to pass through.  
 4. Because it allows electric current to pass through.  
 5. Because it doesn't allow electric current to pass through.  
 6. To avoid occurrence of electric fires  
 7. Because it causes electric overload that heats up wires leading to electric fires.  
 8. Because this causes an increase in the temperature of these machines that leads to electric fires  
 9. Because water is a good conductor of electricity, so it increases fires and could harm the rescuers.  
 10. To avoid occurrence of electric shock.  
 11. To prevent inserting another body in it.  
 12. Because the electric insulating material such as wood will prevent the transfer of electricity from the injured person to your body.  
 13. To avoid occurrence of electric fires.  
 14. To avoid occurrence of electric shock as water is a good conductor of electricity.  
 15. To avoid occurrence of many dangers as electric shock.  
 16. To avoid occurrence of electric shock when touching the electric wires (cables).  
 17. Because copper is a good conductor of electricity.



6. 1. Iron 2. electric conductors.  
3. The electric shock  
4. electric shock. 5. conductors  
6. Electric insulators 7. sand,  
8. water. 9. good  
10. wood (or plastic). 11. Electric burns  
12. electric fires. 13. electric burns.

7. 1. The electric current will flow through the circuit as copper is a good conductor of electricity.  
2. The electric current doesn't flow through the electric circuit, because glass is a bad conductor of electricity.  
3. When the temperature of the heater increases, it may burn the furniture or rugs causing fires.  
4. It causes electric overload, so the wires heat up causing electric fires.  
5. This causes an electric shock.  
6. This causes an electric shock.  
7. This causes an electric shock.  
8. This causes an electric shock.  
9. The fire will increase and could harm the rescuers as water is a good conductor of electricity.  
10. This causes an electric shock.  
11. This may cause electric burns for you.  
12. This part of your body will expose to electric burn.  
13. This causes an electric shock when touching the uncovered wires.  
14. Electricity may cause many dangers as electric fires, electric shock and electric burns.

8.

Points of comparison	Electric conductors	Electric insulators
1. Definition :	They are materials that allow the flow of electricity through them.	They are materials that don't allow the flow of electricity through them.
2. Examples :	Iron - copper.	Wood - plastic.

9. 1. They are materials that allow the flow of electricity through them.  
2. They are materials that don't allow the flow of electricity through them.  
3. They are fires that occur as a result of the increase in the temperature of the electric machines.  
4. It is one of the dangers of electricity that occurs due to the passing of electric current through the human body.  
5. They are burns that result from electricity and cause the damage of the body tissues.

10. Look at the main book on pages (90 &amp; 91)

11. 1. Cooking food and preserving it cold.  
2. Operating some machines as radio and television.  
3. Electric fires. 4. Electric burns.  
5. Don't touch electric machines with wet hand.  
6. Don't put any metallic object in the electric socket.

12. Look at the main book on page (87)

### Timss Questions

1. A. Circuit in figure (b) because rubber (eraser) is a bad conductor of electricity.  
B. Circuit in figure (a) because iron (coin) is a good conductor of electricity.
2. Human body is a good conductor of electricity because 70% of the body contains water, so the electric shock happens when your body is a part of a closed electric circuit. In many cases electric shock causes harms to the tissues.
3. Person (B).
4. First aid for accidents occur as a result of electric shock.



## Unit Three

## Lesson 1

1. c, straight  
2. b, moderate hot, 3. a, the Earth,  
4. b, the Moon is between Earth and the Sun,  
5. d, Solar eclipse 6. b, in the morning,  
7. a, dark shadow area,  
8. b, semi-shadow area,  
9. a, oval,  
10. a, total solar eclipse  
11. c, annular solar eclipse  
12. b, penumbra, 13. a, umbra,  
14. b, smaller than 15. b, Moon  
16. c, partial solar eclipse  
17. b, partial solar eclipse,  
18. a, Umbra 19. b, Penumbra  
20. a, seven minutes and few seconds,  
21. a, retina 22. d, (a) and (b)  
23. a, special glasses.
1. (x) When the Moon lies between the Sun and the Earth ...  
2. (✓) 3. (✓)  
4. (x) ... varies during ...  
5. (✓) 6. (✓)  
7. (x) ... in the umbra region,  
8. (x) In the total solar eclipse ...  
9. (x) We can see the Sun partially ....  
10. (✓) 11. (✓)  
12. (✓) 13. (✓)  
14. (x) Annular solar eclipse is formed ....  
15. (x) Annular solar eclipse occurs ....  
16. (x) The umbra ...  
17. (✓) 18. (✓)  
19. (x) It is not safe ... 20. (✓)
1. Solar eclipse, 2. Solar eclipse,  
3. Umbra, 4. Umbra,  
5. Penumbra, 6. Penumbra,  
7. Penumbra  
8. Total solar eclipse,  
9. Total solar eclipse,  
10. Partial solar eclipse,

11. Annular solar eclipse,
12. Solar eclipse,
13. Partial solar eclipse,
14. Annular solar eclipse,
15. Ultraviolet and infrared rays.

1. shadow 2. The solar eclipse  
3. Moon - Earth 4. Moon - shadow  
5. Moon - oval 6. umbra  
7. equal 8. Umbra  
9. Penumbra 10. Total solar eclipse  
11. annular 12. seven - forty  
13. total solar eclipse - partial solar eclipse  
14. The annular  
15. movement of the Moon  
16. solar eclipse - Moon  
17. part - partial solar eclipse,  
18. ultraviolet rays - infrared rays,  
19. special glasses 20. blindness
1. Because the Earth, the Moon and the Sun are nearly on one straight line with the Moon in the middle.  
2. Because the Moon is a dark body that doesn't allow the sunlight to pass through.  
3. Because the Moon rotates around the Earth in an oval shape orbit.  
4. Due to difference in the part of the Sun that the Moon hides during its passage in front of the Sun.  
5. Because when the Moon rotates nearer to the Earth, its size appears equal to the Sun so, it hides all the sunlight.  
6. Because the Moon's size appears smaller than that of the Sun so, the Sun appears as a lighted ring.  
7. Because the umbra is the dark inner shadow area of the Moon in which no sunlight appears.  
8. Because the penumbra is the faint outer shadow area of the Moon in which a part of the sunlight is hidden.  
9. Because the annular solar eclipse is formed when the Moon is in a higher orbit from Earth so its cone shadow doesn't reach the Earth and the Sun appears as a lighted ring.



10. Because the Sun emits harmful rays to the eye such as ultraviolet rays (UV) and infrared rays that may cause blindness within few seconds.
11. To protect our eyes from ultraviolet and infrared rays coming from the Sun that may cause blindness within few seconds.
12. Because the corona of the Sun emits harmful rays such as ultraviolet and infrared rays.
13. Because the Moon hides all the sunlight from the Earth as the Moon's size appears equal to that of the Sun.

6.
  1. It casts its shadow on the screen.
  2. The solar eclipse occurs.
  3. It appears as total solar eclipse.
  4. It appears as a partial solar eclipse.
  5. It appears as an annular solar eclipse, where the Sun appears as a lighted ring.
  6. Annular solar eclipse occurs.
  7. The solar eclipse appears as annular solar eclipse.
  8. A partial solar eclipse occurs.
  9. The Earth lies in the antumbra area of the Moon forming annular solar eclipse.
  10. The eye retina will be harmed and blindness may occur.
  11. We can watch the solar eclipse safely.
7.
  1. It is an astronomical phenomenon which occurs when the Earth, the Moon and the Sun are nearly in one straight line with the Moon in the middle.
  2. It is the dark inner shadow area in which the total solar eclipse appears.
  3. It is the faint outer shadow area in which the partial solar eclipse appears.
  4. It is the type of solar eclipse in which we can't see the Sun completely and it is formed in the shadow area (umbra) of the Moon.
  5. It is the type of solar eclipse in which we can see part of the Sun and it is formed in the semi shadow area (penumbra) of the Moon.

6. It is the type of solar eclipse in which the Sun appears as a lighted ring and it is formed when the Moon is in a higher orbit from the Earth.

## 8. 1.

Points of comparison	Total solar eclipse	Annular solar eclipse
1. Shape of the Sun :	• We can't see the Sun completely.	• Sun appears as a lighted ring.
2. Position of Moon :	• Closer to the Earth.	• Farther (in a higher orbit) from Earth.
3. Shadow area that is casted on Earth :	• Umbra.	• Antumbra.

## 2.

Points of comparison	Total solar eclipse	Partial solar eclipse
1. Shape of Sun :	• We cannot see the Sun.	• We can see part of the Sun.
2. Shadow area that casts on Earth.	• Umbra.	• Penumbra.

9.
  1. Fig. (1) represents a partial solar eclipse.
  - Fig. (2) represents annular solar eclipse.
  2. • Fig. (1) occurs due to passing the Moon between the Sun and the Earth hiding part of the sunlight from the Earth.
  - Fig. (2) occurs due to the Moon comes in a higher orbit than the Earth, so the Sun appears as a lighted ring.
10.
  1. ① Moon. ② Umbra. ③ Penumbra.
  2. ④ Total solar eclipse.
  - ⑤ Partial solar eclipse.
11.
  1. ① Sun. ② Moon. ③ Umbra.
  - ④ Penumbra. ⑤ Antumbra.
  2. ⑥ Annular solar eclipse.
  - ⑦ Partial solar eclipse.



12. 1. solar eclipse.  
2. (a) The Moon. (b) Umbra.  
(c) The Earth.

### Times Questions

- There are 3 types of solar eclipse which are total solar eclipse that is formed in the umbra of Moon and we cannot see the Sun completely.  
Second type is partial solar eclipse that is formed in semi-shadow area of Moon and we can see the Sun partially.  
Third type is annular solar eclipse that is formed in the antumbra area of Moon.
- No** The solar eclipse phenomenon doesn't last more than seven minutes and forty seconds.
- The ultraviolet and infrared rays that are emitted from the Sun during the solar eclipse affect the eye retina and may cause blindness within few minutes.
- b. Sun, Moon, Earth.
- a. Solar eclipse.  
b. To protect their eyes from the harmful rays that are emitted during solar eclipse that may cause blindness.
1. Fig. (a). 2. Fig. (a).  
3. Fig. (b). 4. Fig. (c).

### Lesson 2

1. b. Moon.  
2. a. Earth is between the Moon and the Sun.  
3. c. umbra.  
4. a. in the middle of lunar month (two times per year).  
5. d. 2 6. c. full moon.  
7. d. red. 8. d. (a) and (b)  
9. b. total lunar eclipse  
10. c. lunar non-eclipse  
11. a. umbra.  
12. c. is repeated at regular periods.  
13. d. no eclipse.  
14. a. total lunar eclipse.  
15. c. without being eclipsed.  
16. a. longer than

1. (x) ... when the Earth lies between the Sun and the Moon ...  
2. (x) ... the Earth casts its shadow on the Moon's surface.  
3. (x) ... of solar eclipse is shorter than that of lunar eclipse.  
4. (✓)  
5. (x) ... of solar eclipse ...  
6. (x) The solar eclipse ...  
7. (x) ... is not harmful ...  
8. (✓)  
9. (x) The lunar eclipse ...  
10. (x) ... two types of shadow ...  
11. (✓) 12. (✓)  
13. (x) ... due to the refraction of ...  
14. (x) ... Earth's umbra.  
15. (x) ... umbra. 16. (✓)  
17. (✓) 18. (✓)  
19. (✓)  
20. (x) The solar eclipse ... while lunar eclipse ...  
21. (x) ... for more than two hours.  
22. (✓)

1. in the middle 2. red  
3. The lunar eclipse 4. solar eclipse  
5. Total lunar eclipse 6. semi-shaded  
7. Lunar eclipse 8. 1982  
9. year. 10. hours.

1. Lunar eclipse. 2. Lunar eclipse.  
3. Umbra. 4. Lunar eclipse.  
5. Penumbra. 6. Lunar eclipse.  
7. Total lunar eclipse. 8. Infrared rays.  
9. Partial lunar eclipse.  
10. Lunar non-eclipse.  
11. Lunar eclipse.

1. the Sun 2. Lunar eclipse  
3. Moon - Earth 4. middle - full moon.  
5. two times 6. 1982.  
7. one - two 8. lunar  
9. The lunar eclipse - Earth  
10. umbra - penumbra.  
11. total lunar eclipse - partial lunar eclipse.  
12. Total lunar eclipse



13. Moon                                      14. red - total  
15. infrared - refracted  
16. Partial lunar eclipse  
17. lunar non-eclipse  
18. fifty one minutes.  
19. astronomical - blocking  
20. lunar - solar  
21. solar - lunar                              22. lunar - solar

6. 1. To hide all sunlight or part of it from reaching the Moon.  
2. Because in the middle of the lunar month, the Earth lies between the Sun and the Moon.  
3. Because it doesn't harm the eyes during observing it.  
4. Because when it comes between the Sun and Moon, it casts its shadow on the Moon causing the lunar eclipse.  
5. Because when a part of the Moon enters the umbra region of the Earth, it causes partial lunar eclipse, while when the whole Moon enters the umbra region of the Earth, it causes total lunar eclipse.  
6. Due to the refraction of some infrared rays that are not absorbed by the Earth's atmosphere.  
7. Because the Earth has a great size relative to Moon so, it always blocks all sunlight when it comes between the Sun and the Moon on the same straight line.  
8. Because the lunar eclipse may last for one or two hours and doesn't require precautions or special devices to observe it.  
9. Because the lunar eclipse doesn't cause any harm to eye, but the solar eclipse causes serious harm to the eyes as blindness.  
10. Because no sunlight passes in straight lines and if a dark object like Moon in solar eclipse or Earth in lunar eclipse obstruct it a shadow (umbra) is formed.  
11. Because they occur as a result of the Earth and the Moon rotation which can be calculated by scientists.

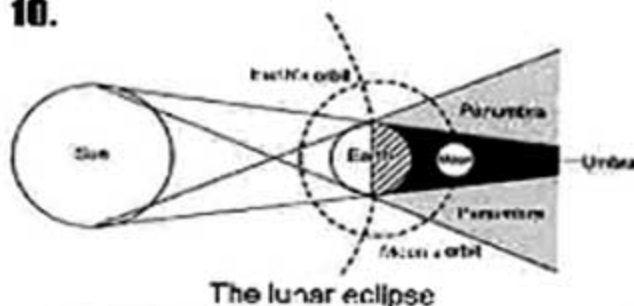
7. 1. The lunar eclipse occurs.  
2. Total lunar eclipse occurs.  
3. The Moon light turns to be faint without being eclipsed which is known as lunar non-eclipse.  
4. Total lunar eclipse occurs.  
5. Partial lunar eclipse occurs.  
6. There is no harm occurs to his eyes, because lunar eclipse doesn't require precautions or special devices to observe it.
8. 1. It is the astronomical phenomenon which occurs when the Sun, Earth and the Moon are nearly on one straight line with Earth in the middle hiding the sunlight from the Moon.  
2. It is the lunar eclipse which the whole Moon enters the shadow area (umbra) of the Earth.  
3. It is the lunar eclipse which occurs when part of the Moon enters the shadow area (umbra) of the Earth.

9. 1.

Points of comparison	Solar eclipse	Lunar eclipse
1. How does it occur?	1. It occurs when the Moon comes between the Earth and the Sun on one straight line.	1. It occurs when the Earth comes between the Moon and the Sun on one straight line.
2. Time of occurrence :	2. It seen at morning only.	2. It seen at night only.
3. Its duration :	3. Its duration doesn't exceed seven minutes and few seconds.	3. Its duration may last for more than two hours.
4. Safety precautions :	4. It requires precautions and special devices to observe it, because it causes serious harm to the eye.	4. It doesn't require precautions and special devices to observe it, because it doesn't cause any harm to eye.



10.



11. 1. total lunar eclipse.  
2. ① Moon's orbit. ② Earth's orbit.  
③ Earth's penumbra. ④ Earth's umbra.

12. 1. lunar eclipse  
2. ① The Sun.  
② Earth's penumbra.  
③ Earth's umbra.  
3. one hour - two hours.  
4. ③ Partial lunar eclipse.  
⑤ Total lunar eclipse.

13.

Total lunar eclipse	Partial lunar eclipse
It is the lunar eclipse which occurs when the whole Moon enters the shadow area (umbra) of the Earth.	It is the lunar eclipse which occurs when part of the Moon enters the shadow area (umbra) of the Earth.

14. 1. partial lunar 2. partial lunar  
3. total lunar

### Timss Questions

1. d  
2. d. Observing the Sun during solar eclipse.  
3. Because in case of occurrence of lunar eclipse, no annular lunar eclipse is formed because the Earth has a great size relative to the Moon, so it always blocks all sunlight when it comes between the Sun and the Moon on the same straight line.

## Unit Four

1. 1. d. photosynthesis 2. a. soil.  
3. b. root hairs. 4. d. (a), (b) and (c).  
5. a. epidermis → cortex → endodermis → xylem → pith.  
6. b. Root hairs 7. c. endodermis.  
8. a. cortex layer. 9. a. epidermis  
10. b. osmosis.  
11. b. Selective permeability  
12. d. (b) and (c) are correct.  
13. b. transpiration 14. c. losing  
15. c. Transpiration 16. b. stomata.  
17. a. stomata.  
18. c. lower surface of the leaf.  
19. a. two 20. d. wood  
21. c. the passage of some salts only according to the plant's need.  
22. b. Mercury level will rise.

2. (A) 1. c 2. b 3. a  
(B) 1. b 2. d 3. a 4. c

3. 1. (✓) 2. (✓)  
3. (✓)  
4. (x) ... plant's root is epidermis.  
5. (✓)  
6. (x) ... of the epidermis layer.  
7. (✓)  
8. (x) ... responsible for absorption and transmission of water and mineral salts.  
9. (x) ... has the selective permeability property ...  
10. (✓) 11. (x) Transpiration ...  
12. (✓)  
13. (x) ... water vapour.  
14. (x) ... two guard cells ...  
15. (x) ... on the lower surface ...

4. 1. Root. 2. Transpiration.  
3. transpiration. 4. guard.

5. 1. Photosynthesis process.  
2. Photosynthesis process.  
3. Light energy. 4. Root system.



5. Root system.
7. Epidermis.
9. Big vacuole.
10. Wood tissue (xylem).
11. Osmosis feature.
12. Transpiration process.
13. Osmosis.
14. Osmosis feature.
15. Endodermis.
16. Transpiration process.
17. Pith layer.
18. Root system.
19. Cortex layer.
20. Stomata.
21. Stomata.
22. Stoma.
23. Transpiration process.
24. Two guard cells.
25. Stomata.
26. Selective permeability.

6. 1. photosynthesis  
2. carbon dioxide - photosynthesis  
3. phosphorus - nitrogen  
4. root system.  
5. root hairs  
6. cortex xylem - pith  
7. epidermis.  
8. pith.  
9. Cortex - endodermis  
10. epidermis - root.  
11. panicles - fix  
12. Root  
13. vacuole - soil  
14. salt solution - higher  
15. selective permeability  
16. selective permeability.  
17. osmosis feature - selective permeability.  
18. transpiration  
19. lower  
20. stomata - lower  
21. two guard  
22. stoma  
23. stomata - transpiration.  
24. stomata - transpiration  
25. transpiration

7. 1. To make their food by photosynthesis process.  
2. To make their own food.  
3. a. To fix the plant in the soil.  
b. To absorb water and mineral salts from the soil.  
4. Due to the osmosis feature that takes place through the semi-permeable membrane of the root hairs.  
5. Because the solution inside the root hair vacuole contains less water and more salt than the soil solution.

6. To get rid of excess water in the plant by transpiration process.
7. To control opening and closing the stoma.
8. Due to the osmosis feature, where the concentration of salt in the root hairs is higher than the concentration of salt in the soil.
9. To open and close the stoma.

8. 1. The plant cannot make its food by photosynthesis process due to the absence of light.  
2. The plant cannot be fixed in the soil and as the root cannot absorb water and mineral salts from the soil that necessary for photosynthesis process.  
3. Water will pass from the root hair vacuole to the soil by osmosis and the plant will wilt and die.  
4. Water cannot pass from the root to the stem and leaves.  
5. The stoma cannot be opened or closed.  
6. The plant cannot get rid of excess water by transpiration process.  
7. Water drops are condensed on the inner surface of the bell jar.  
8. Water can't transport from the soil to the root hairs so the plant will wilt and die.  
9. The root hairs can't control passing of some types of salts according to the plant's need.

9. 1. It is a vital process by which the plant loses excess water in the form of water vapour through stomata which spread on the two surfaces of the leaf and other green parts to the surrounding environment of the plant.  
2. It is the transmission of water molecules through semi-permeable membrane from an area with high concentration of water to an area of low concentration of water.  
3. It is a process by which the cell membrane of the root hair allows some types of salts to pass according to the plant's need.

10. Pith → xylem layer → endodermis layer → cortex layer → epidermis layer.



- 11.** 1. a. It fixes the plant in the soil.  
b. It absorbs water and mineral salts from the soil.  
2. They help the plant to get rid of excess water through transpiration process.  
3. They control opening and closing of the stomata.  
4. They absorb water and mineral salts from the soil.  
5. It regulates the passage of water to the xylem (wood tissue).
- 
- 12.** (1) → (4) → (3) → (2)
- 
- 13.** - This figure represents the structure of the root.
- |               |                |
|---------------|----------------|
| ① Cortex.     | ② Epidermis.   |
| ③ Endodermis. | ④ Xylem.       |
| ⑤ Pith.       | ⑥ Root system. |
- 
- 14.** 1. (i) Two guard cells. (ii) Stoma.  
2. a closed stoma – an open stoma.

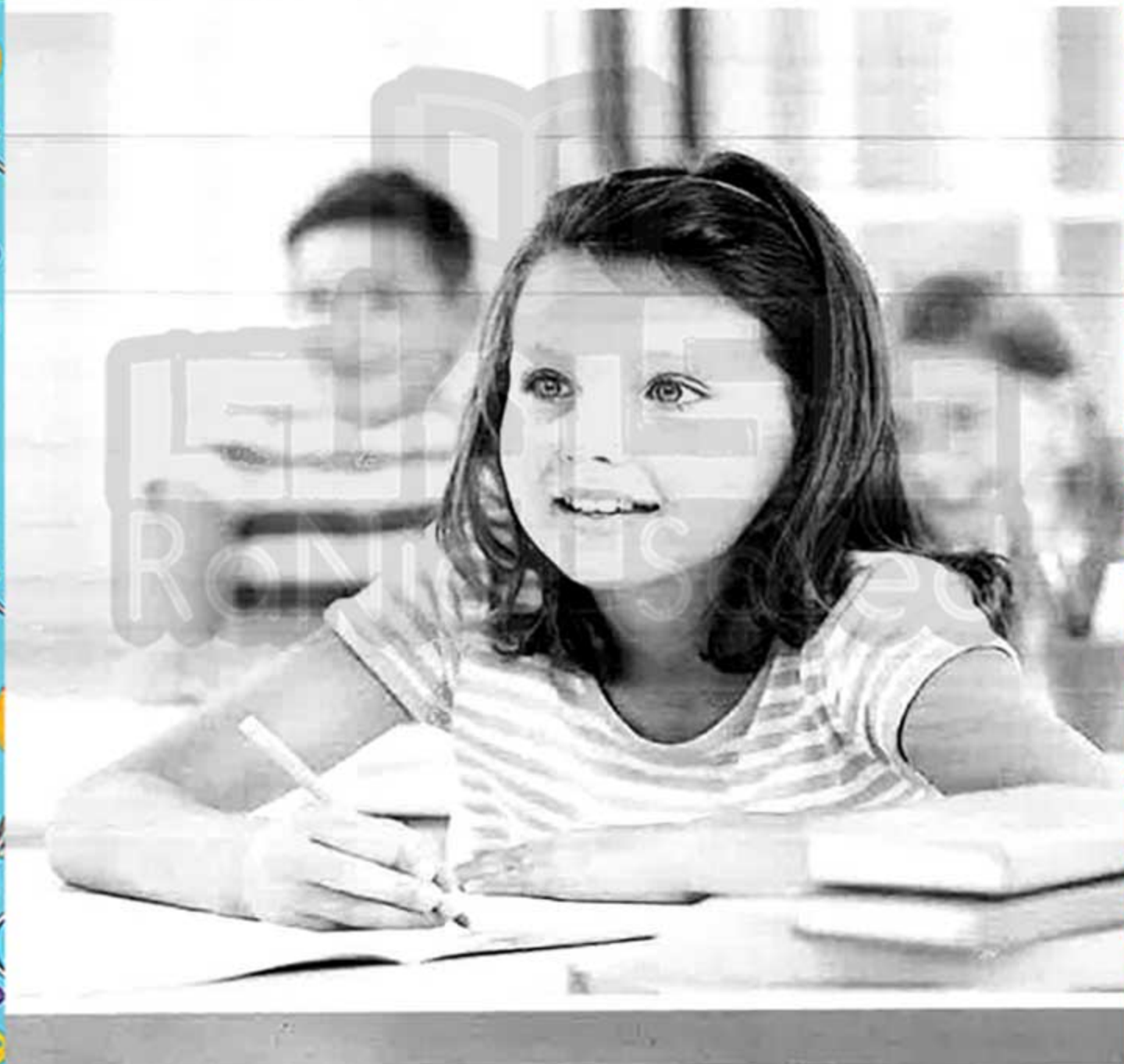
### True Questions

1. b. Cover the soil and the planter with a fabric coated with vaseline and put the planter under a bell jar, drops of water will be seen on the inner surface of the bell jar.
2. a.  $\text{Water} + \text{Carbon dioxide} + \text{Energy} \longrightarrow \text{Sugar} + \text{Oxygen}$
3. Selective permeability.
4. 1. d. To prevent loss of water from the soil and planter walls.  
2. (a) and (c).



# PART 2

## Guide Answers of Worksheets



هذا العمل خاص بموقع ذاكرولي التعليمي ولا يسمح بتداوله على مواقع أخرى



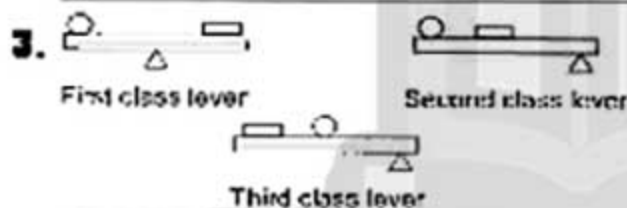
## Worksheet 1

1. 1. first - tweezers  
2. resistance force - effort force - fulcrum.  
3. speed 4. resistance force - effort force.  
5. Tweezers - manual broom

2. [A] 1. Because they are used in :  
- increasing force. - increasing speed.  
- increasing distance. - avoiding dangers.

2. Because its fulcrum lies between the effort force and resistance force.

[B] 1. First 2. third 3. first



4. [A] 1. It is a rigid bar that rotates around a fixed point, and is affected by an effort force and resistance force.  
2. It is the lever that has the effort force between the fulcrum and the resistance force.

[B] 1. Fulcrum. 2. First class levers.  
3. Second class levers.

5.

First class levers	Second class levers	Third class levers
Wipers - Nail clipper - Hammer claw.	Bottle opener - Stapler - Nutcracker.	Tweezers - Ice holder - Fishing hook.

## Worksheet 2

1. 1. effort force - resistance force.  
2. its arm - Resistance force - its arm.  
3. third  
4. the effort arm - the resistance arm.  
5. effort - resistance

2. [A] 1. The effort force is smaller than the resistance force and this lever saves effort.

2. The lever doesn't save effort

3. The amount of effort force is double the amount of resistance force and this lever doesn't save effort.

[B] 1. third class 2. second class

3. 1. Effort force  $\times$  its arm  
= Resistance force  $\times$  its arm.  
 $30 \times 160 = \text{Resistance} \times 60$   
Resistance force =  $\frac{30 \times 160}{60} = 80$  Newton.  
This lever is from 1<sup>st</sup> type of levers.

2. Effort force  $\times$  its arm  
= Resistance force  $\times$  its arm.  
 $300 = 60 \times \text{its arm}$   
Resistance arm =  $\frac{300}{60} = 5$  cm.

4.

Points of comparison	First class levers	Second class levers	Third class levers
1. Definition :	They are levers that have fulcrum between the resistance force and effort force.	They are levers that have the resistance force between the fulcrum and effort force.	They are levers that have the effort force between the fulcrum and resistance force.
2. Conservation of effort :	Some of them save effort, but the others don't.	Save effort.	Don't save effort.
3. Example :	Seesaw.	Nutcracker	Tweezers

5. [A] 1. Resistance arm. 2. Effort arm.

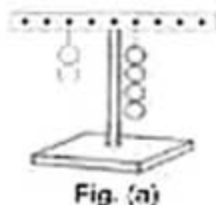
[B] - Fig. (a) :

The resistance force  
= 2 Newton

The resistance arm  
= 2 cm.

The effort arm  
= 1 cm.

So, the effort force =  $\frac{2 \times 2}{1}$   
= 4 Newton.





- Fig. (b) :

The resistance

= 1 Newton

The resistance arm

= 3 cm.

The effort arm = 1 cm.

So, the effort force =  $\frac{1 \times 3}{1}$   
= 3 Newton.

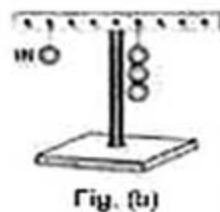


Fig. (b)

## General Exercise of the School Book on Unit 1

1. 1. b    2. c    3. a    4. g    5. d

2. 1. (X) The second class .....  
2. (X) The third class .....  
3. (X) The first class .....  
4. (✓)  
5. (X) ... .. doesn't conserve effort

3. 1. second class    2. third class  
3. first class    4. Resistance  $\times$  its arm.  
5. first class lever.

4.

Points of comparison	First class lever	Second class lever	Third class lever
Definition :	It is a lever that has fulcrum between the effort force and resistance.	It is a lever that has resistance between the fulcrum and the effort force.	It is a lever that has the effort force between fulcrum and resistance.
Conservation of effort :	Some of them conserve effort, but the others don't.	It always conserves effort.	It doesn't conserve effort.
Examples :	Scissors, crowbar, pliers, nail clippers and paddle.	Wheelbarrow, stapler, soda water opener and nutcracker.	Manual bronin, hockey bat, tweezers and coal holder.

5. 1. Third class lever.    2. First class lever,  
3. Second class lever. 4. Third class lever.  
5. First class lever.    6. Second class lever

6. Effort force  $\times$  its arm = Resistance force  $\times$  its arm.  
 $200 \times 50 = 1000 \times \text{its arm}$   
Arm of resistance =  $\frac{200 \times 50}{1000} = 10 \text{ cm.}$

7. Effort force  $\times$  its arm = Resistance force  $\times$  its arm.  
Effort force  $\times 5 = 300 \times 15$   
Effort (affecting) force =  $\frac{300 \times 15}{5} = 900 \text{ Newton.}$

## Model Exam 1 on Unit 1

1. 1. increasing force - increasing speed.  
2. the force arm - the resistance arm.  
3. first - third  
4. effort force - resistance force.  
5. the resistance - fulcrum.

2. [A] 1. Because they consist of a rigid bar that rotates around a fixed point called fulcrum and is affected by an effort force and a resistance force.

2. Because the arm of force is always longer than the arm of resistance, so effort force is always smaller than resistance force.

- [B] 1. First class levers.  
2. The effort force.  
3. Second class levers.

3. 1. c. the nutcracker. 2. c. third  
3. c. =    4. b. decreasing speed.  
5. c. Manual broom.

4. [A] 1. The effort force is larger than the resistance and the lever doesn't conserve effort.

2. The effort force is equal to the resistance force.

- [B] 1. second  
2. avoid dangers.  
3. second.



## Answers of Worksheets

5. [A] 1. Manual broom.  
2. Tweezers.

- [B] 1. b. 2 N  
2. d. 8 N

## Model Exam 2 on Unit 1

1. [A] 1. a. first  
2. b. Hammer claw  
3. c. Coal holder.

- [B] 1. Because in this lever we use a small force to make a great effort.  
2. Because the effort arm is always shorter than the resistance arm, so the effort force is always larger than the resistance force.

2. [A] 1. Second class levers.  
2. Law of levers.  
3. First class levers.

- [B] 1. It is a fixed point, where the bar rotates around.  
2. It is the distance between the effort force and fulcrum.

3. 1. effort force - resistance force.  
2. the force arm - the resistance arm.  
3. the force arm - the resistance arm.  
4. resistance force - the effort force.  
5. 5 Newton.

4. 1. (X) ..... and nutcracker are .....  
2. (X) ..... haven't .....  
3. (X) ..... metre.  
4. (X) ..... increase the speed.  
5. (✓)

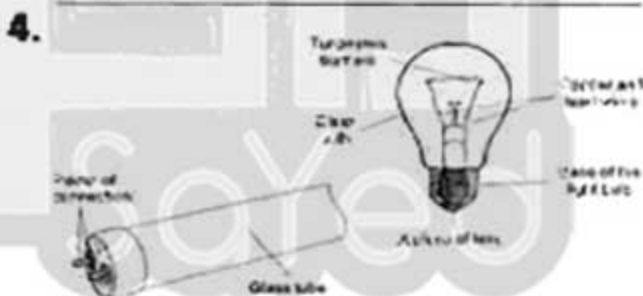
5. [A] Effort force  $\times$  its arm = Resistance force  $\times$  its arm  
 $360 \times 4 = 200 \times \text{its arm}$   
Resistance arm =  $\frac{360 \times 4}{200} = 7.2 \text{ cm}$   
[B] 1. d    2. c    3. e    4. a

## Worksheet 3

1. 1. Two side nails base.  
2. Fluorescent lamp.  
3. Phosphoric material.  
4. Tungsten filament.    5. Electric lamps.

2. [A] 1. argon.  
2. tungsten.  
3. artificial light.  
[B] 1. The filament will melt at the high temperatures, so the lamp will not light.  
2. The tungsten filament will burn when it heats up.

3. 1. Light bulb - fluorescent lamp  
2. The filament  
3. The light bulb - the fluorescent lamp  
4. Argon gas  
5. The spiral base - two side nails base  
6. Copper and lead wires  
7. tungsten

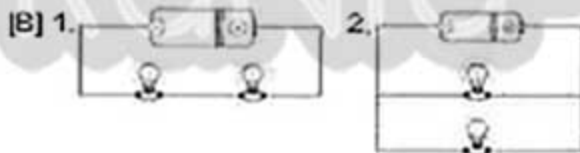


5. [A] 1. Because they allow the electric current to transfer from the base of the lamp to the tungsten filament.  
2. Because it protects the filament from burning and increases the lifetime of the filament.  
3. Because tungsten has high melting point that prevents the melting of the filament at high temperatures.  
[B] 1. They connect the fluorescent lamp to the electricity.  
2. It heats up and emits light when the electric current passes through it.



## Worksheet 4

1. c. closed electric circuit  
2. c. Battery  
3. a. parallel.  
4. d. (a) or (b).  
5. d. (b) and (c)
1. Series connection.  
2. The electric wires.  
3. Parallel connection.  
4. Parallel connection.  
5. Parallel connection.
1. Circuit (c). 2. Circuit (b). 3. Circuit (c)
1. battery - lamp - electric wires.  
2. Parallel connection - series connection  
3. series - parallel  
4. doesn't change  
5. decreases
- [A] 1. Because all the electric lamps in the house are connected in parallel.  
2. Because in series connection, there is one route for the electric current to pass through.  
3. Because in parallel connection, there are branching routes for the electric current to pass through.



## Worksheet 5

1. b. Falling from the top of a ladder.  
2. d. wood.  
3. b. sand.  
4. d. (a), (b) and (c).  
5. c. Fires resulting from electricity
1. Electric insulators. 2. Electric fires.  
3. Electric fires.  
4. Electric conductors.  
5. Water.

## 3. [A]

Regular fires	Electric fires
We use water to put out them.	We can't use water to put out them, but we use sand, because water is a good conductor of electricity.

[B] 1. Because we use it to :

- Cook food and preserve it cold.
- Light our houses, factories, streets ,
- Operate some machines as radios, televisions and washing machines.

2. Because this causes electric overload, so the wires heat up causing fires.

3. Because it allows the electric current to pass through it.

## 4. [A] 1. The electric shock - electric fires

2. electric conductors plastic

[B]

Points of comparison	Electric conductors	Electric insulators
1. Definitions :	They are materials that allow the flow of electricity through them.	They are materials that don't allow the flow of electricity through them.
2. Examples:	Copper, iron and aluminium.	Wood, plastic and rubber.

5. 1. Fig. (a) , because the metallic coin is a good conductor of electricity.

2. Fig. (b). because plastic is a bad conductor of electricity.

3. Materials are divided according to their conductivity of electricity into electric conductors and electric insulators.



## Answers of Worksheets

## Worksheet 6

1.	The behaviour	(✓) or (x)
1.		(x)
2.		(x)
3.		(✓)
4.		(x)
5.		(✓)

2. [A] 1. The electric fire  
2. good conductor 3. Iron  
[B] - It represents a direct injury which is the electric shock.  
- It occurs when a part of your body touches a wire that has an electric current and the other part touches a material that conducts electricity.

3. 1. Electric burns. 2. Electric shock.  
3. Electric burns. 4. Electric shock.  
5. Electric burns.

4. 1. d. play with the electric connections.  
2. d. (a) and (b).  
3. c. passing the electric current through the human body  
4. d. Electric shock 5. c. electric burns.

5. [A] 1. Don't leave the wires naked and not insulated.  
2. Place a piece of plastic in the socket to prevent inserting another body in it.  
3. Do not place several connections in the same socket.  
[B] 1. To prevent inserting another body in it to avoid the occurrence of the electric shock.  
2. To avoid electric shocks.

## General Exercise of the School Book on Unit 2

1. 1. Series connection – parallel connection  
2. Don't insert a metallic object in the socket – don't place many connections in the same socket  
3. battery – lamp – electric wires.  
4. Rubber – clothes – plastic  
5. series

2. 1. light 2. tungsten.  
3. series 4. fluorescent lamp.  
5. The electric shock 6. parallel.  
7. in parallel 8. argon gas.  
9. Copper

3. 1. To protect the filament from burning and increase the lifetime of the filament.  
2. To avoid occurrence of electric shock.  
3. To connect the fluorescent lamp to the electricity.  
4. To avoid occurrence of electric fires.

4. 1.

Points of comparison	Series connection	Parallel connection
Light intensity :	Decreases by increasing the number of lamps.	Remains constant by increasing or decreasing the number of lamps.
Removing one of the lamps from the connection :	The other light bulbs are turned off.	The other light bulbs are lighted up with the same intensity.

- 2.

Point of comparison	Light bulb	Fluorescent lamp
Structure :	It consists of : - One filament of tungsten. - Glass bulb. - Base of the light bulb.	It consists of : - Glass tube. - Two filaments of tungsten. - Points of connection.

- 3.

Points of comparison	Conducting materials of electricity	Non-conducting materials of electricity
Definition :	They are materials that allow the electric current to pass through.	They are materials that don't allow the electric current to pass through.
Examples :	Iron – copper.	Wood – plastic.



5. 1. Electric conductors. 2. Electric fires.  
3. Electric insulators.  
4. Series connection. 5. Electric lamp.  
6. Parallel connection. 7. Electric shock.  
8. Electric burns.

6. 1. It is one of the dangers of electricity that occurs due to passing the electric current through the human body.  
2. They are fires that occur as a result of an increase in the temperature of the electric machines.  
3. It is a tool that converts the electric energy into light energy.  
4. Look at the main book on pages (88 & 89).

### Model Exam 1 on Unit 2

1. 1. argon – mercury vapour.  
2. insulators – conductors.  
3. decreases.  
4. parallel.  
5. the electric current – death.  
6. simple electric wires.
2. [A] 1. To prevent air from reaching the filament to protect it from burning.  
2. To avoid occurrence of electric shock.  
[B] 1. Copper and lead wires.  
2. Sand.  
3. Fluorescent lamps.
3. 1. b. electric burns. 2. b. in parallel.  
3. a. electric circuit will be opened.  
4. d. Mercury vapour.  
5. c. plastic.
4. [A] 1. inert  
2. Thomas Alpha Edison.  
3. water.  
[B] 1. The other lamps in the electric circuit will be turned off.  
2. This causes an electric shock.

5. [A] 1. (x) 2. (✓) 3. (x)  
[B] 1. parallel – series.  
2. less than  
3. The other lamps will turn off.

### Model Exam 2 on Unit 2

1. 1. d. increase the lifetime of the filament.  
2. b. it is a good conductor of electricity.  
3. c. rubber.  
4. b. high melting point.  
5. d. (a), (b) and (c).
2. [A] 1. Electric fire.  
2. Electric insulators.  
3. The base of the light bulb.  
[B] 1. The filament will melt at the high temperatures.  
2. The fire will increase and could harm the rescuers of electricity.
3. 1. don't play with the electric connections – don't insert a metallic object in the socket  
2. series.  
3. electric burns  
4. spiral base – two side nails  
5. curtains – heat – electric heater  
6. The electric current
4. [A] 1. To prevent turning off all the lamps of the house when one lamp is damaged or turned off.  
2. To connect the fluorescent lamp to the electricity.  
[B] 1. It is a closed and continuous path through which the electric current will pass making a complete cycle.  
2. They are fires that occur as a result of the increase in the temperature of the electric machines.  
3. It is a way in which the light bulbs are connected in branching routes.



## Answers of Worksheets

5. [A]

Point of comparison	Connecting in series	Connecting in parallel
1. Light Intensity of the lamps :	Decreases by increasing the number of lamps.	Remains constant by increasing or decreasing the number of lamps.
2. Removing one of the lamps from the connection :	The other lamps are turned off.	The other lamps are lighted up with the same intensity.

[B] 1. phosphoric 2. argon  
3. iron

## Worksheet 7

1. total solar eclipse - partial solar eclipse - annular solar eclipse.  
2. seven - forty  
3. Total  
4. the Moon - the Sun - the Earth.  
5. antumbra
- [A] 1. To protect our eyes from ultraviolet and infrared rays coming from the Sun that may cause blindness within few seconds.  
2. Due to the difference in the part of the Sun that the Moon hides during its passage in front of the Sun.  
[B] 1. straight 2. an oval 3. partial
- [A] 1. It casts its shadow on the screen.  
2. A total solar eclipse occurs.  
[B] 1. Umbra.  
2. Annular solar eclipse.  
3. Penumbra.
- [A] 1. It is the type of solar eclipse in which we can't see the Sun completely and it is formed in the shadow area (umbra) of the Moon.

2. It is the type of solar eclipse in which we can see a part of the Sun and it is formed in the semi-shadow area (penumbra) of the Moon.

[B] 1. b 2. c 3. a

1. (1) The Moon (2) Umbra.  
(3) Penumbra.  
2. (A) Total solar eclipse.  
(B) Partial solar eclipse.

## Worksheet 8

1. Lunar eclipse - Earth  
2. whole - umbra.  
3. total lunar eclipse - partial lunar eclipse.  
4. middle - full Moon. 5. two hours.  
6. Moon
- [A] 1. Total lunar eclipse occurs.  
2. The Moon light turns to be faint without being eclipsed and this phenomenon is known as lunar non-eclipse.  
[B] 1. two eclipses per year. 2. red  
3. Total lunar eclipse
- [A] 1. Because the lunar eclipse doesn't cause any harm to the eyes.  
2. Due to the refraction of some infrared rays that are not absorbed by the Earth's atmosphere.  
[B] 1. Partial lunar eclipse.  
2. Solar eclipse.

4.

Points of comparison	Solar eclipse	Lunar eclipse
1. How does it occur?	It occurs when the Moon comes between the Earth and the Sun on one straight line.	It occurs when the Earth comes between the Moon and the Sun on one straight line.
2. Its duration:	It doesn't exceed 7 minutes and 40 seconds.	It may last for more than two hours.



5. 1. total lunar eclipse.  
2. ① Moon's orbit.  
② Earth's orbit.  
③ Earth's penumbra.  
④ Earth's umbra.

### General Exercise of the School Book on Unit 3

1. 1. Because the Sun emits harmful rays to the eye retina such as ultraviolet rays and infrared rays that may cause blindness within few seconds.  
2. Due to the difference in the part of the Sun that the Moon hides during its passage in front of the Sun.  
3. Because the Earth has a great size relative to the Moon, so it always blocks all sun light when it comes between the Sun and the Moon on the same straight line.  
4. Because the Moon hides all the sunlight from the Earth as the Moon's size appears equal to that of the Sun.
2. 1. solar eclipse – Moon  
2. The lunar eclipse – Earth  
3. Annular
3. 1. (✓) 2. (✓) 3. (✓)
4. 1. It is the dark inner shadow area in which the total solar eclipse appears.  
2. It is the faint outer shadow area in which the partial solar eclipse appears.  
3. It is the solar eclipse in which we can't see the Sun completely and it is formed in the shadow area (umbra) of the Moon.  
4. It is the solar eclipse in which we can see part of the Sun and it is formed in the semi-shadow area (penumbra) of the Moon.  
5. It is the lunar eclipse in which the whole Moon enters the shadow area (umbra) of the Earth.

5. 1.

Points of differences	Solar eclipse	Lunar eclipse
1. How does it occur?	1. It occurs when the Moon comes between the Earth and the Sun on one straight line.	1. It occurs when the Earth comes between the Moon and the Sun on one straight line.
2. Time of occurrence :	2. It occurs at morning only.	2. It occurs at night only.
3. Its duration :	3. Its duration doesn't exceed seven minutes and few seconds.	3. Its duration may last for more than two hours.
4. Safety precautions :	4. It requires precautions and special devices to observe it, because it causes serious harms to the eye.	4. It doesn't require precautions and special devices to observe it because it doesn't cause any harm to eye.

- 2.

Points of comparison	Total solar eclipse	Annular solar eclipse
1. Shape of the Sun :	- We can't see the Sun completely.	- It appears as a lighted ring.
2. Position of Moon :	- Nearer to the Earth.	- Farther (in a higher orbit) from Earth.
3. Shadow area that is casted on the Earth :	- Umbra.	- Antumbra.

6. 1. Total lunar eclipse.  
2. Partial lunar eclipse.  
3. The solar eclipse.



## Model Exam ① on Unit ③

1. Earth – Moon.  
2. total solar eclipse.  
3. umbra – penumbra  
4. annular solar - Earth  
5. semi-shaded area (penumbra) – faint  
6. Special glasses
- [A] 1. Because the Earth, the Moon and the Sun are nearly on one straight line with the Moon in the middle.  
2. Because when part of the Moon enters the umbra, it causes partial lunar eclipse, while when the whole Moon enters the umbra, it causes total lunar eclipse.  
[B] 1. Umbra                      2. two  
3. two.
1. b. Annular eclipse  
2. a. shorter than  
3. a. in the middle  
4. d. solar eclipse.  
5. d. Lunar non-eclipse
- [A] 1. Umbra.  
2. Lunar eclipse.  
3. Total solar eclipse.  
[B] 1. Annular solar eclipse occurs.  
2. There is no harm occurs to his eye, because lunar eclipse doesn't require precautions or special devices to observe it.

5. [A]

Total lunar eclipse	Partial lunar eclipse
It is the lunar eclipse which occurs when the whole Moon enters the shadow area (umbra) of the Earth.	It is the lunar eclipse which occurs when part of the Moon enters the shadow area (umbra) of the Earth.

[B] 1. {X}                      2. {✓}                      3. {✓}

## Model Exam ② on Unit ③

1. a. the whole Moon enters the shadow area of the Earth,  
2. b. higher than  
3. c. equal to  
4. a. umbra  
5. d. is repeated at regular periods.
- [A] 1. Partial solar eclipse.  
2. Penumbra.  
3. Ultraviolet and infrared rays.  
[B] 1. The Earth lies in the antumbra area of the Moon forming annular solar eclipse.  
2. Partial lunar eclipse occurs.
1. the Moon – the Earth.  
2. middle – two times  
3. red – refraction  
4. movement – Sun.  
5. straight – shadow
- [A] 1. Because the Earth has a great size relative to the Moon, so it always blocks all sunlight when it comes between the Sun and the Moon on the same straight line.  
2. Because the Moon rotates around the Earth in an oval shape orbit.

[B]

Points of comparison	Total solar eclipse	Partial solar eclipse
Cause of occurrence :	It is formed when the Earth lies in the shadow area (umbra) of the Moon.	It is formed when the Earth lies in the semi-shadow area (penumbra) of the Moon.
Shape of Sun :	We can't see the Sun completely.	We can see part of the Sun.



5. [A] 1. (x) 2. (✓) 3. (x) 4. (✓)

- [B] 1. It is the astronomical phenomenon which occurs when the Sun, Earth and the Moon are nearly on one straight line with the Earth in the middle hiding the sunlight from the Moon.  
2. It is the solar eclipse in which the Sun appears as a lighted ring and it is formed when the Moon is in a higher orbit from the Earth.

### Worksheet 2

1. Cortex layer - endodermis layer  
2. the lower surface - two guard cells.  
3. Root hair.  
4. stomata - transpiration process.  
5. osmosis feature - selective permeability.  
6. shoot system.
1. Root system. 2. Root hair.  
3. Selective permeability.  
4. Osmosis feature. 5. Pith layer.
- [A] 1. To get rid of the excess water by transpiration process.  
2. To make their own food.  
3. Because :  
- It is branched and extended through the soil particles to fix the plant in the soil.  
- It absorbs water and mineral salts from the soil.  
[B] 1. They control opening and closing of the stomata by changing their shapes.  
2. They help the plant to get rid of excess water through transpiration process.
- [A] 1. the root system.  
2. (✓) Epidermis layer. (✓) Root hair.  
(✓) Endodermis.  
(✓) Xylem (wood) layer.  
[B] 1. b. pith layer.  
2. d. (a), (b) and (c).  
3. b. the epidermis layer.
- [A] 1. (✓) 2. (x) 3. (x)  
[B] 1. stoma.

2. (1) Two guard cells. (2) Stoma  
3. closed stoma - open stoma.

### General Exercise of the School Book on Unit 4

1. c. lower surface of the leaf.  
2. a. osmosis.  
3. b. transpiration.
1. Osmosis feature. 2. Root hair.  
3. Transpiration process.  
4. Xylem (wood tissue).  
5. Two guard cells.  
6. Selective permeability.
1. Transpiration 2. Root  
3. Transpiration. 4. guard
1. (x) Root .....  
2. (x) ..... in transpiration.  
3. (x) Plant stoma .....
- b. Mercury level will rise.
1. It is a vital process by which the plant loses excess water in the form of water vapour through stomata which spread on the two surfaces of the leaf and other green parts to the surrounding environment of the plant.  
2. It is the transmission of water molecules through semi-permeable membrane from an area with high concentration of water to an area with low concentration of water.  
3. It is a process by which the cell membrane of the root hair allows some types of salts to pass according to the plant's need.

### Model Exam on Unit 4

1. stomata - green  
2. Transpiration - pulling force  
3. carbon dioxide gas - photosynthesis  
4. Root hairs - xylem  
5. Endodermis - water



2. [A] 1. Due to the osmosis feature that takes place through the semi-permeable membrane of the root hairs.  
2. To open and close the stomata.
- [B] 1. Transpiration process.  
2. Light energy.  
3. Osmosis feature.
3. 1. c. selective permeability.  
2. b. lower than  
3. c. epidermis.  
4. c. lower surface of the leaf.  
5. d. (a), (b) and (c).
4. [A] 1. The stomata cannot be opened or closed.  
2. Water can't transport from the soil to the root hairs.
- [B] 1. Transpiration  
2. Water

5. [A] 1.

Points of comparison	Osmosis feature	Transpiration process
1. Definition :	It is the transmission of water molecules through semi-permeable membrane from an area with high concentration of water to an area of low concentration of water.	It is a vital process by which the plant loses excess water in the form of water vapour through stomata which spread on the two surfaces of the leaf and other green parts to the surrounding environment of the plant.
2. Takes place in :	The root system.	All the green parts of the plant.

[B] It regulates the passage of water to the xylem (wood tissue).



PART 3

# Guide Answers of Final Examinations



هذا العمل خاص بموقع ذاكرولي التعليمي ولا يسمح بتداوله على مواقع أخرى



### Cairo Governorate

## 1 Manor House International Schools

- 1.** 1. argon - mercury vapour,  
2. resistance arm - effort force arm,  
3. lunar - solar  
4. electric light  
5. fulcrum,  
6. Moon - oval  
7. Archimedes,
- 
- 2.** 1. Parallel connection.  
2. Partial lunar eclipse.  
3. Second class levers,
- 
- 3. (A)** 1. Because it emits harmful rays as ultraviolet (UV) and infrared rays that effects the eye retina and may cause blindness within few seconds,  
2. Because it has fulcrum between the effort force and the resistance force.  
3. To avoid occurrence of electric shock as water is a good conductor of electricity.
- (B)** Effort force  $\times$  its arm = Resistance force  $\times$  its arm  
 $100 \times 5 = \text{Resistance force} \times 20$   
 $\therefore \text{Resistance force} = \frac{100 \times 5}{20}$   
 $= 25 \text{ Newton}$   
- This lever does not save effort.
- 
- 4. (A)** 1. This lever is a third class lever.  
2. The total lunar eclipse occurs.
- (B)** 1. Light bulb.  
2. Ⓐ Glass bulb,  
Ⓑ Argon gas,  
Ⓒ Tungsten filament,  
Ⓓ Copper and lead wires,  
Ⓔ Base of light bulb.

### Additional questions

- (A) 1. (x) 2. (✓);  
(B) 1. Photosynthesis process.  
2. Light energy.

## 2 Patriarchal College

- 1. (A)** 1. the effort arm - the resistance arm,  
2. electric fires,  
3. phosphoric material,  
4. electric burns 5. resistance - effort  
6. Solar eclipse
- (B)** 1. The electric current doesn't flow through the electric circuit, because glass is a bad conductor of electricity.  
2. The fire will increase and could harm the rescuers, because water is a good conductor of electricity.
- 
- 2. (A)** 1. Electric shock.  
2. Partial lunar eclipse.  
3. Indirect injuries. 4. Penumbra.
- (B)** 1. It heats up and emits light when the electric current passes through it.  
2. It works as a source of electric current in the electric circuit.
- (C) In series connection :**  
- The light bulbs are connected one after another in one route.  
- The light intensity decreases by increasing the number of lamps.
- In parallel connection :**  
- The light bulbs are connected in branching routes.  
- The light intensity remains constant by increasing or decreasing the number of lamps.
- 
- 3. (A)** 1. d. overload and electric fire.  
2. c. full Moon 3. c. electric burn.  
4. d. no eclipse.
- (B)** 1. It is a closed and continuous path through which, the electric current will pass making a complete cycle.  
2. It is the 'total' eclipse which occurs when the whole Moon enters the shadow area (umbra) of the Earth.
- (C) Effort force  $\times$  Its arm = Resistance force  $\times$  Its arm**  
 $200 \times 50 = 1000 \times \text{Its arm}$   
 $\therefore \text{Arm of resistance} = \frac{200 \times 50}{1000}$   
 $= 10 \text{ cm.}$



- This lever may be first class lever or second class lever.

4. (A) 1. (x) ... into light energy.  
2. (✓)  
3. (x) ... the first class lever and it saves effort.  
4. (✓)
- (B) 1. Because it emits harmful rays to the eye such as ultraviolet (UV) and infrared rays that may cause blindness within few seconds.  
2. Because in the 2<sup>nd</sup> class levers, the effort force arm is always longer than the resistance arm.
- (C) a. Do not play with the electric connections.  
b. Do not insert a metallic object in the socket.  
c. Do not touch the electric machines that are connected to the electric current with wet hand.  
d. Do not try to fix or clean any electric machine while connected to the electric current.

## Additional questions

- (A) 1. photosynthesis  
2. shoot system.
- (B) 1. The plant cannot make photosynthesis process due to the absence of light.  
2. The stoma cannot be opened or closed.

1. (A) 1. h. 14<sup>th</sup>  
2. b. seesaw.  
3. b. its high melting point.  
4. b. 20 cm.
- (B) 1. a. Parallel connection.  
b. Series connection.  
2. a. The other three light bulbs are lighted up with the same light intensity.  
b. The other three light bulbs are turned off.

- (C) 1. The solar eclipse occurs.  
2. The fire will increase and could harm resources as water is a good conductor of electricity.

2. (A) 1. Third class levers.  
2. Electric shock.  
3. Lunar non-eclipse.  
4. Electric lamp.

(B) Effort force  $\times$  its arm = Resistance force  $\times$  its arm

$$500 \times 20 = 200 \times \text{its arm}$$

$$\therefore \text{Resistance arm} = \frac{500 \times 20}{200} = 50 \text{ cm.}$$

- Yes this lever is in state of balance, because the result of effort force  $\times$  its arm equals to the result of resistance force  $\times$  its arm.

- (C) 1. ① The Sun.  
② The Moon.  
③ The Earth  
④ Earth's umbra.  
2. red - Earth's atmosphere doesn't absorb infrared rays coming from the Sun and reflects them on Moon.

3. (A) 1. Used to pick up very small objects.  
2. It protects the filament from burning and increases the lifetime of the filament.

(B)

Solar eclipse	Lunar eclipse
1. It is seen at morning only.	1. It is seen at night only.
2. It causes serious harms to eyes.	2. It doesn't cause any harm to eyes.

- (C) a. The solar eclipse.  
b. Because the outer solar corona emits ultraviolet (UV) and infrared rays that effects the eye retina and may cause blindness within few minutes.

4. (A) 1. ... in the fluorescent lamp contains ...  
2. ... which always save ...  
3. Wood and plastic ...  
4. The manual broom is ...



## Answers of Final Examinations

- (B) 1. Because they occur as a result of the Earth and the Moon rotation which can be calculated by scientists.  
2. To avoid occurrence of electric fires.
- (C) Circuit (A), because iron (coin) is a good conductor of electricity which allow the flow of electricity through.

## Additional questions

- (A) 1. (x) 2. (x)  
(B) 1. To make their own food.  
2. To open and close the stomata.

## 4 East Nasr City Educational Directorate

1. 1. Fulcrum.  
2. First class levers.  
3. Thomas Alpha Edison.  
4. Parallel connection.  
5. Umbra.  
6. Annular solar eclipse.
2. (A) Effort force  $\times$  Its arm = Resistance force  $\times$  Its arm  
 $50 \times 20 = \text{Resistance force} \times 5$   
 $\therefore \text{Resistance force} = \frac{50 \times 20}{5}$   
 $= 200 \text{ Newton}$   
(B) 1. (x) 2. (x) 3. (x) 4. (✓)
3. 1. middle 2. Solar  
3. doesn't change. 4. lungsten.  
5. first  
6. the arm of resistance and force are equal.
4. (A) 1. 2<sup>nd</sup> class lever.  
2. 3<sup>rd</sup> class lever.  
3. doesn't save.  
4. lunar.
- (B) 1. Because seesaw has fulcrum between the effort force and resistance force, while wheelbarrow has the resistance force between effort force and fulcrum.  
2. Because water is a good conductor of electricity, so it increases fires and could harm the rescuers.

## Additional questions

- (A) 1. shoot system, 2. transpiration  
(B) 1. Stomata, 2. Epidermis.

## 5 Red El Farag Directorate Saint Mary's School

1. (A) 1. c. argon 2. h. partial lunar  
3. c. nutcracker. 4. b. lungsten.  
5. c. Fulcrum 6. b. light  
7. b. the light intensity decreases.  
8. a. Iron
- (B) 1. Because they are important in other things as :  
• Increasing distance.  
• Increasing speed.  
• Avoid dangers.  
• Accuracy in performance.  
2. To prevent turning off all the lamps of the house when one lamp is damaged or turned off.
2. (A) 1. Electric shock.  
2. The solar eclipse.  
3. Second class levers.  
4. Phosphoric material.  
5. Mercury vapour.  
6. Total lunar eclipse.
- (B) 1. This causes an electric shock.  
2. When the temperature of the heater increases, it may burn the furniture and rugs causing electric fires.  
3. The eye retina will be harmed and blindness may occur.
3. (A) 1. resistance force - effort force.  
2. 3<sup>rd</sup> class  
3. a good conductor of electricity.  
4. two hours. 5. first class
- (B) ① Electric bulb.  
② Electric wire.  
③ Switch.  
④ Battery.
- (C) Effort force  $\times$  Its arm = Resistance force  $\times$  Its arm  
 $50 \times 20 = \text{Resistance force} \times 5$   
 $\therefore \text{Resistance force} = \frac{50 \times 20}{5}$   
 $= 200 \text{ Newton}$



4. (A) 1. (✓) 2. (x) 3. (✓) 4. (✓)  
5. (✓) 6. (✓)

(B) It is a rigid bar (straight or curved) that rotates around a fixed point called fulcrum, and is affected by an effort force and a resistance force.

- (C) 1. A part of your body touches fire or sparks resulting from the electric fire.  
2. Do not play with the electric connections.

## Additional questions

- (A) 1. c. losing 2. b. root hairs.  
(B) 1. (x) 2. (x)

## Giza Governorate

7

## Al-Mostakbal Modern Language School

1. first - third  
2. light bulb - fluorescent lamp.  
3. Wood - plastic - rubber  
4. a good conductor of electricity  
5. Series connection - parallel connection.  
6. Moon 7. annular
- (A) 1. b 2. a 3. d 4. c  
(B) Effort force  $\times$  its arm = Resistance force  $\times$  its arm  
 $500 \times 20 = 200 \times \text{its arm}$   
 $\therefore \text{Resistance arm} = \frac{500 \times 20}{200}$   
 $= 50 \text{ cm.}$
1. Fulcrum. 2. Third class lever.  
3. Parallel connection.  
4. Electric shock.  
5. Partial lunar eclipse  
6. Total solar eclipse.
- (A) 1. Because it has high melting point that prevents the melting of the filament at high temperatures.  
2. To avoid occurrence of electric fires.  
3. Because the Earth has a great size relative to the Moon, so it always blocks a sunlight when it comes between the sun and the Moon on the same straight line.

4. Because the Sun emits harmful rays in the eye such as ultraviolet rays (UV) and infrared ray that may cause blindness within few seconds.

- (B) 1. (✓) 2. (✓)

## Additional questions

- (A) 1. The stomata cannot be opened or closed.  
2. The plant cannot make photosynthesis process due to the absence of light.  
(B) 1. To make their own food.  
2. To open and close the stomata.

7

## Experimental Language Schools Inspectorate

- (A) 1. Crowbar - scissors  
2. total lunar eclipse - partial lunar eclipse.  
3. argon - mercury vapour.  
(B) 1. first 2. electric shock  
3. electric
- (A) 1. Parallel connection.  
2. Electric conductors.  
3. Lever. 4. Electric circuit.  
(B) Because it has high melting point that prevents the melting of filament at high temperatures.
- (A) 1. a. copper. 2. b. middle  
3. b. increasing size. 4. b. Second  
(B) Effort force  $\times$  its arm = Resistance force  $\times$  its arm  
Effort force  $\times 5 = 10 \times 2$   
 $\therefore \text{Effort force} = \frac{10 \times 2}{5} = 4 \text{ Newton}$
- (A) 1. (✓) 2. (x) 3. (x) 4. (x)  
(B) The fire will increase and could harm the rescuers as water is a good conductor of electricity.

## Additional questions

- (A) 1. transpiration 2. shoot system.  
(B) 1. Photosynthesis process.  
2. Light energy.



## Answers of Final Examinations

## Alexandria Governorate

## 8 Brilliance Language School

1. (A) 1. second - first  
2. tungsten - melting point.  
3. Solar - Moon  
4. copper - good conductor
- (B) 1. series.  
2. The other two light bulbs are turned off.
2. (A) 1. Electric insulators.  
2. Electric shock.  
3. Fulcrum.  
4. Total lunar eclipse.
- (B) Effort force  $\times$  its arm = Resistance force  $\times$  its arm  
 $100 \times \text{its arm} = 200 \times 20$   
 $\therefore$  The length of the force arm  
 $= \frac{200 \times 20}{100} = 40 \text{ cm.}$
3. (A) 1. a. Fishing hook 2. b. Edison.  
3. a. rubber. 4. c. no eclipse.
- (B) 1. Because water is a good conductor of electricity, so it increases fires and could harm the rescuers.  
2. Because the effort arm is always longer than the resistance arm, so the effort force is always smaller than the resistance force.
4. (A) 1. (x) .... in the first class lever ....  
2. (x) .... the solar eclipse ....  
3. (✓)  
4. (x) .... a good conductor ....
- (B) 1. The filament will burn when it heats up.  
2. The effort force is larger than the resistance force and the lever doesn't conserve effort.

## Additional questions

- (A) 1. d. photosynthesis 2. a. two
- (B) 1. The plant cannot make photosynthesis process due to the absence of light.  
2. The stomata cannot be opened or closed.

## 9 El-Agamy Educational Directorate

1. 1. first - third  
2. tungsten - melting point.  
3. the strength of the electric current that passes through the human body - the time taken by the electric current.
2. (A) 1. The Moon light turns to be faint without being eclipsed which is known as lunar non-eclipse.  
2. The filament will burn when it heats up.
- (B) 1. c. decreasing the speed.  
2. b. rubber. 3. a. coal holder.  
4. c. lunar eclipse.
3. (A) 1. Because it has the resistance force between fulcrum and the effort force.  
2. To protect the filament of tungsten from burning so the lifetime of the filament increases.
- (B) 1. Electric lamp. 2. Electric burns.  
3. Phosphoric material.  
4. Fulcrum.
4. (A) Effort force  $\times$  its arm = resistance force  $\times$  its arm  
 $400 \times 100 = 800 \times \text{its arm}$   
 $\therefore$  Resistance arm =  $\frac{400 \times 100}{800} = 50 \text{ cm.}$
- (B) 1. Lunar eclipse.  
2. ☾ Moon. ☼ Earth. ☼ Sun.

## Additional questions

- (A) 1. shoot system.  
2. photosynthesis
- (B) To make their own food.

## 10 East Zone Educational Directorate

1. (A) 1. effort arm - resistance arm.  
2. electric - light  
3. the Moon - the Sun  
4. good - bad
- (B) 1. Partial lunar eclipse occurs.  
2. When one of the lamps damaged or turned off, all the other lamps in the house will turn off.



2. (A) 1. Fulcrum. 2. Electric shock.  
3. Argon gas.

(B) Effort force  $\times$  Its arm = Resistance force  $\times$  Its arm

$$500 \times 20 = 20 \times \text{Its arm}$$

$$\therefore \text{Resistance arm} = \frac{500 \times 20}{20} = 5000 \text{ cm.}$$

3. (A) 1. (x) 2. (✓) 3. (x) 4. (✓)

(B) 1. Because the Sun emits harmful rays to the eye such as ultraviolet rays (UV) and Infrared rays that may cause blindness within few seconds.

2. Due to the refraction of some infrared rays that are not absorbed by the Earth's atmosphere.

4. (A) 1. a. coal holder. 2. b. less  
3. c. nutcracker. 4. d. doesn't change.

(B) Fig. (a). Because iron (metallic coin) is a good conductor of electricity.

#### Additional questions

- (A) 1. The sunna cannot be opened or closed.  
2. The plant cannot make photosynthesis process due to the absence of light.

- (B) 1. (x) 2. (✓)

11

El Gomrok Educational  
Directorate

1. (A) 1. Solar eclipse  
2. conductor - insulator  
3. second - third

(B) The law of lever = Effort force  $\times$  Its arm  
= Resistance force  $\times$  Its arm

$$500 \times 20 = 200 \times \text{Its arm}$$

$$\therefore \text{Resistance arm} = \frac{500 \times 20}{200} = 50 \text{ cm.}$$

2. (A) 1. c. Mercury vapour.  
2. a. first 3. a. electric fire.  
4. a. the middle

(B) 1. Because the effort arm always longer than the resistance arm, so the effort force is always smaller than the resistance force.

2. Because the Sun emits harmful rays to the eye such as ultraviolet rays (UV) and infrared rays that cause blindness within few seconds

3. (A) 1. Parallel connection.  
2. Fulcrum. 3. Electric burns.  
4. Archimedes.

(B) 1. Partial lunar eclipse occurs.  
2. This causes an electric shock.

4. (A) ① Tungsten filament, ② Argon gas.  
③ Copper and lead wire.  
④ Glass bulb.  
⑤ Base of the light bulb.

(B) spiral base.

(C) It protects the filament from burning when it heats up and increases its lifetime.

#### Additional questions

- (A) 1. transpiration  
2. shoot system.

- (B) 1. Photosynthesis process.  
2. Light energy

12

Middle Zone Educational  
Directorate

1. (A) 1. second - third 2. dangers.  
3. first - manual broom  
4. light bulbs - fluorescent lamps.  
5. solar eclipse - Moon

(B) This may cause electric burns for a human body.

2. (A) 1. Series connection.  
2. Copper and lead wire.  
3. Electric burns.

(B)

Points of comparing	Solar eclipse	Lunar eclipse
The body that hides sunlight :	Moon.	Earth.
Occurrence time :	It is seen at morning only.	It is seen at night only.
Duration time :	It doesn't exceed seven minutes and few seconds.	It may last for more than two hours.



## Answers of Final Examinations

3. 1. b. effort, 2. b. Tweezers  
3. a. Newton, 4. c. Mercury  
5. b. overload, 6. a. umbra area

4. (A) 1. Effort force  $\times$  its arm = Resistance force  $\times$  its arm  
 $200 \times 20 = 400 \times \text{its arm}$

$$\therefore \text{Resistance arm} = \frac{20 \times 200}{400} = 10 \text{ cm.}$$

2. Yes, this lever saves effort because the force arm is longer than the resistance arm.

- (B) 1. Because it emits harmful rays to the eye such as ultraviolet rays (UV) and infrared rays that cause blindness within few seconds.

2. To maintain the heart beats of the injured.

## Additional questions

- (A) 1. a. epidermis 2. b. stoma

- (B) 1. To control opening and closing the stoma.  
2. To make their own food.

## 13 Al Qaliubya Governorate

1. (A) 1. first class - third class  
2. total lunar eclipse - partial lunar eclipse.  
3. Iron - copper - lead  
4. second class - third class.  
5. Parallel connection - series connection  
6. the filament - the glass bulb - the base of the light bulb.  
7. effort - resistance

- (B) 1. first 2. solar  
3. sand, 4. argon.  
5. third 6. two  
7. electric burns, 8.  $\approx 10 \text{ cm.}$

2. (A) 1. (x) 2. (x) 3. (✓)  
4. (✓) 5. (x) 6. (x)

- (B) 1. The effort force is equal to the resistance force.  
2. This part of your body will expose to electric burn.  
3. The solar eclipse occurs.

- (C) 1. ① Battery.  
② Electric bulb.  
③ Switch.  
④ Electric wire.  
2. a. closed 3. b. opened.

3. (A) 1. Penumbra, 2. Fulcrum.  
3. The law of levers, 4. Tungsten.  
5. Total lunar eclipse.  
6. Third class levers.

- (B) 1. To prevent turning off all the lamps of the house when one lamp is damaged or turned off.  
2. Because the effort arm is longer than the resistance arm.

- (C) 1. Crowbar, 2. Hockey bat.  
3. Phosphoric material.  
4. Do not place several connections in the same socket.

4. (A) 1. c. red, 2. c. electric fire.  
3. b. Mercury vapour.  
4. c. retina 5. c. water pump.  
6. c. both (a) and (b).

- (B) Effort force  $\times$  its arm = Resistance force  $\times$  its arm  
 $500 \times 20 = 200 \times \text{its arm}$

$$\therefore \text{Resistance arm} = \frac{500 \times 20}{200} = 50 \text{ cm.}$$

- This lever doesn't save effort because the force arm is shorter than the resistance arm.

- (C) 1. d 2. a 3. b 4. c

- (D) 1. Lunar eclipse, 2. Umbra.  
3. Penumbra.  
4. Partial lunar eclipse occurs.

## Additional questions

- (A) 1. The plant cannot be fixed in the soil and also the root cannot absorb water and mineral salts that are necessary for photosynthesis process.

2. Water cannot transport from the soil to the root hairs, so the plant will wilt and die.

- (B) 1. photosynthesis 2. epidermis.



## 14 Menofia Governorate

1. (A) 1. crowbar - seesaw.  
2. Moon - Earth  
3. the strength of the electric current that passes through the human body - the time taken by the electric current to pass through.  
4. nutcracker - manual brown
- (B) 1. It protects the filament from burning when it heats up and increases its life time.  
2. To connect the lamp to the electric circuit.
2. (A) 1. First class lever.  
2. Second class lever.  
3. Phosphoric material.  
4. Partial lunar eclipse.
- (B) 1. Because the Earth has a great size relative to the Moon, so it always blocks all sunlight when it comes between the Sun and the Moon on the same straight line.  
2. Because the effort arm is always shorter than the resistance arm, so the effort force is always larger than the resistance force.
3. (A) 1. a. aluminum.  
2. a. nutcracker.  
3. a. first.  
4. c. remains constant.
- (B) 1. Total lunar eclipse occurs.  
2. The eye retina will be harmed and blindness may occur.
4. (A) 1. (x) 2. (✓) 3. (✓) 4. (✓)
- (B) Effort force  $\times$  Its arm = Resistance force  $\times$  Its arm  
 $500 \times 20 = 200 \times \text{Its arm}$   
 $\therefore \text{Resistance arm} = \frac{500 \times 20}{200} = 50 \text{ cm.}$
- (C) ① Argon gas.  
② Tungsten filament.  
③ Glass bulb.  
④ Base of the light bulb.

## Additional questions

- (A) 1. The stomata cannot be opened or closed.  
2. The plant cannot make photosynthesis process due to the absence of light.
- (B) 1. c. losing 2. b. root hairs.

## 15 Gharbia Governorate

1. (A) 1. first  
2. closed  
3. the shadow  
4. Tweezers
- (B) 1. Because it heats up and emits light when the electric current passes through it.  
2. Because in the second levers, the effort arm is always longer than the resistance arm.
2. (A) 1. Retina.  
2. Electric insulators.  
3. Third class lever.  
4. Electric burns.
- (B) Effort force  $\times$  its arm = Resistance force  $\times$  its arm  
 $40 \times 5 = \text{Resistance force} \times 25$   
 $\therefore \text{Resistance force (the weight)}$   
 $= \frac{40 \times 5}{25} = 8 \text{ Newton.}$
3. (A) 1. a. Archimedes.  
2. c. no lunar  
3. b. Mercury vapour.  
4. c. wheelbarrow.
- (B) 1. The solar eclipse occurs.  
2. The effort force and the resistance force are equal and this lever doesn't conserve effort.
4. (A) 1. hockey ball 2. red  
3. penumbra.  
4. The base of the light bulb.
- (B) 1. parallel.  
2. doesn't change - there are branching routes for the electric current to pass through the circuit.



## Answers of Final Examinations

## Additional questions

- (A) 1. (x) 2. (✓)  
 (B) 1. Photosynthesis process.  
 2. Light energy.

## 16 Dakahlia Governorate

1. (A) 1. The force arm – the resistance arm.  
 2. increasing force – increasing distance.  
 3. Direct injuries – indirect injuries.  
 4. closed.  
 5. argon – mercury vapour.  
 6. Moon – Earth – three.  
 (B) 1. Second class lever.  
 2. Yes, it conserves effort.  
 3. The force arm is longer than the resistance arm.  
 4. Nutcracker.

2. (A) 1. Electric burns.  
 2. Electric insulators.  
 3. Parallel connection.  
 4. Retina.  
 5. Penumbra.  
 6. The law of levers.  
 (B) 1. The filament will burn when it heats up.  
 2. Partial lunar eclipse occurs.  
 3. The fire will increase and could harm the rescuers as water is a good conductor of electricity.

3. (A) 1. (✓) 2. (x) 3. (x)  
 4. (x) 5. (✓) 6. (✓)  
 (B) 1. Because they are important in other things as :  
 - Increasing distance.  
 - Increasing speed.  
 - Avoid dangers.  
 - Accuracy in performance.  
 2. To prevent turning off all the lamps of the house when one lamp is damaged or turned off.  
 3. Because the whole Moon enters the shadow area (umbra) of the Earth.  
 4. Because it has high melting point that prevents the melting of the filament at high temperatures.

4. (A) 1. a. Archimedes 2. a. plastic.  
 3. b. annular 4. a. first  
 5. b. 14<sup>th</sup> 6. a. light  
 (B) 1. series.  
 2. The lamps remain lighting as iron (coin) is a good conductor of electricity.  
 3. The other two lamps are turned off.

## Additional questions

- (A) 1. To make their own food.  
 2. To open and close the stomata.  
 (B) 1. transpiration.  
 2. shoot system.

## 17 Ismailia Governorate

1. (A) 1. a. first 2. b. Iron  
 3. c. lunar non-eclipse.  
 4. b. Nutcracker  
 (B) ① Glass bulb.  
 ② Tungsten filament.  
 ③ Argon gas.  
 ④ Base of the light bulb.  
 (C) Effort force  $\times$  Its arm = Resistance force  $\times$  Its arm  
 $500 \times 20 = 200 \times \text{Its arm}$   
 $\therefore \text{Resistance arm} = \frac{500 \times 20}{200} = 50 \text{ cm.}$   
 2. (A) 1. force – resistance  
 2. argon – mercury vapour.  
 3. first – third class lever  
 (B) 1. a. Series connection.  
 b. Parallel connection.  
 2. Circuit (b).  
 3. To prevent turning off all the lamps of the house when one lamp is damaged or turned off.  
 (C) 1. Increasing speed.  
 2. Increasing distance.  
 3. (A) 1. Because the effort arm is always longer than the resistance arm, so the effort force is always smaller than the resistance force.  
 2. Because the Sun emits harmful rays to the eye such as ultraviolet rays (UV) and infrared rays that may cause blindness within few seconds.



- (B) 1. Fulcrum, 2. Electric burns,  
3. Total lunar eclipse, 4. Lever.

- (C) 1. Solar eclipse.  
2. (a) Sun, (b) Moon, (c) Earth.

4. (A) 1. The effort force is equal to the resistance force and this lever doesn't conserve effort.  
2. Partial lunar eclipse occurs.

- (B) 1. (x) 2. (✓) 3. (✓) 4. (x)

- (C) 1. Do not place several connections in the same socket.  
2. Do not play with the electric connections.

## Additional questions

- (A) 1. d. photosynthesis  
2. a. two

- (B) 1. Root hairs.  
2. Light energy.

18

## Suez Governorate

1. (A) 1. effort force – fulcrum.  
2. second – first  
3. battery – electric wires.  
4. argon 5. electric current

- (B) 1. (✓) 2. (x) 3. (✓) 4. (✓)

2. (A) 1. Fulcrum, 2. Series connection,  
3. Electric lamp, 4. Electric insulators.

- (B) 1. To avoid occurrence of electric fire.  
2. Because the effort arm is always longer than the resistance arm, so the effort force is always smaller than the resistance force.

3. (A) 1. c. copper,  
2. a. annular eclipse,  
3. a. decreasing speed,  
4. c. faint.

- (B) Effort force  $\times$  Its arm = Resistance force  $\times$  Its arm  
 $200 \times 5 = 100 \times \text{its arm}$   
 $\therefore \text{Resistance arm} = \frac{200 \times 5}{100} = 10 \text{ cm.}$

4. (A) 1. first  
2. Lunar eclipse

(B)

P.O.C	Solar eclipse	Lunar eclipse
Reason :	It occurs when the Moon comes between Earth and Sun on one straight line.	It occurs when Earth comes between Moon and Sun on one straight line.
Time of occurrence :	It is seen at morning only.	It is seen at night only.

- (C) ① Glass bulb.  
② Tungsten filament.  
③ Argon gas  
④ Base of the light bulb.

## Additional questions

- (A) 1. It is the transmission of water molecules through semi-permeable membrane from an area with high concentration of water to an area of low concentration of water.  
2. It is a process by which the cell membrane of the root hair allows some types of salts to pass according to the plant's need.

- (B) The stoma cannot be opened or closed.

19

## Kafr El-Sheikh Governorate

1. (A) 1. a. 2 2. a. tungsten,  
3. a. first 4. a. in the morning.

- (B) 1. Electric circuit.  
2. The circuit will be open, so the electric current does not pass through the circuit and the lamp doesn't light.

2. (A) 1. b 2. c 3. d 4. a

- (B) 1. Electric conductors.  
2. Indirect injuries.

3. (A) 1. To protect the filament from burning, so the lifetime of the filament increases.  
2. Because the effort arm is always longer than the resistance arm, so the effort force is always smaller than the resistance force.



- (B) 1. parallel, 2. Lunar  
3. less bright 4. argon

4. (A) 1. (x) 2. (✓) 3. (x) 4. (✓)

(B) Earth - red.

#### Additional questions

(A) 1. Stoma.

2. Root system.

(B) - It fixes the plant in the soil.

- It absorbs water and mineral salts from the soil.

#### 20 Behlra Governorate

1. (A) 1. Moon - Earth  
2. effort force - resistance force,  
3. third - effort force  
4. light bulbs - fluorescent lamps.

(B) 1. Because it has high melting point that prevents the melting of the filament at high temperatures.

2. Because in these levers, we use a small force to make a great effort.

2. (A) 1. effort force, resistance force and fulcrum.  
2. phosphoric material.  
3. second  
4. electric shock.

(B) 1. It protects the filament from burning when it heats up and increases its life time.

2. To protect the eye retina from the harmful rays as ultraviolet (UV) and infrared rays that emit from the Sun and may cause blindness within few minutes.

3. (A) 1. First class lever.  
2. Total lunar eclipse.  
3. The law of levers.  
4. Lever.

(B) 1. The fluorescent lamp can't be connected to the electricity.  
2. The lever saves effort.

4. (A) 1. d. red.  
2. a. coal holder.  
3. c. Mercury vapour.  
4. a. Newton.

(B) Effort force  $\times$  its arm = Resistance force  $\times$  its arm

$$400 \times 20 = 200 \times 20$$

$$8000 \neq 4000$$

So, this lever isn't in state of balance because the result of effort force  $\times$  its arm is not equal to the result of resistance  $\times$  its arm

#### Additional questions

- (A) 1. (x) 2. (✓)

(B) To open and close the stoma.

#### 21 Fayoum Governorate

1. (A) 1. Lunar eclipse - Earth  
2. second class - third class  
3. first - third  
4. lungster - melting point.

(B) Effort force  $\times$  its arm = Resistance force  $\times$  its arm

$$\text{Effort force} \times 10 = 200 \times 20$$

$$\therefore \text{Effort (effort) force} = \frac{200 \times 20}{10}$$

$$= 400 \text{ Newton.}$$

2. (A) 1. light 2. second  
3. bad 4. Fulcrum

(B) 1. When the temperature of heater increases, it may burn the furniture and rugs causing electric fires.  
2. Partial lunar eclipse occurs.

3. (A) 1. c. argon 2. a. No lunar  
3. d. Copper 4. b. parallel.

(B) (1) Electric bulb. (2) Electric wire.  
(3) Battery. (4) Connecting wire.

4. (A) 1. Lever.  
2. Total lunar eclipse.  
3. Electric burns.  
4. First class lever.



- (B) 1. Because the sunlight passes in straight lines and if a dark object like the Moon in solar eclipse or Earth in lunar eclipse obstruct it, a shadow (umbra) is formed.  
2. To connect the lamp to the electric circuit.

## Additional questions

- (A) Pith → Xylem layer → Endodermis layer → Cortex layer → Epidermis layer.  
(B) 1. They absorb water and mineral salts from the soil.  
2. It regulates the passage of water to the xylem (wood tissue).

## 22

## El-Minia Governorate

1. (A) 1. Newton 2. second  
3. Thomas Alva Edison.  
4. twice  
(B) Effort force  $\times$  Its arm = Resistance force  $\times$  Its arm.  
 $500 \times 20 = 200 \times \text{Its arm}$   
 $\therefore \text{Resistance arm (Location)} = \frac{500 \times 20}{200}$   
 $= 50 \text{ cm.}$
2. (A) 1. Resistance force.  
2. First class Lever.  
3. Battery.  
4. Solar eclipse.  
(B) 1. Light bulb.  
2. ① Glass bulb.  
② Argon gas.  
③ Tungsten filament.  
④ Base of the light bulb.
3. (A) 1. parallel 2. first  
3. umbra 4. tungsten.  
(B) 1. Because the effort arm is always shorter than the resistance arm, so the effort force is always larger than the resistance force.

2. To protect our eyes from ultraviolet and infrared rays coming from the Sun that may cause blindness within few seconds.

4. (A) 1. b. Penumbra  
2. n. Glass bulb  
3. b. shorter  
4. c. resistance force

- (B) 1. Series  
2. Parallel  
3. parallel - when one or more lamps burn out, the other lamps don't turn off.

## Additional questions

- (A) Water cannot transport from the soil to the root hairs so the plant will wilt and die.  
(B) 1. To open and close the stomata.  
2. To make their own food.

## 23

## Assuit Governorate

1. 1. first class lever.  
2. Moon - Earth.  
3. conductors - insulators.  
4. third
2. (A) 1. (✓)  
2. (x) The tungsten filament of the light bulb ...  
3. (x) ... the lever does not save effort.  
4. (x) ... in the middle of lunar month.  
5. (✓)  
(B) 1. The fire will increase and could harm the rescuers as water is a good conductor of electricity.  
2. When one of the lamps damaged or turned off, all the other lamps in the house will turn off.
3. (A) 1. Parallel connection.  
2. Partial lunar eclipse.  
3. Electric burns.  
4. Third class lever.  
(B) 1. Because the Sun emits harmful rays to the eye such as ultraviolet ray (UV) and infrared rays that may cause blindness within few seconds.



## Answers of Final Examinations

2. Because sometimes in the 1<sup>st</sup> class levers, the effort arm is longer than the resistance arm.

4. (A) 1. Light bulb.  
2. ① Tungsten filament.  
② Glass bulb.  
③ Base of the light bulb.

(B) Effort force  $\times$  its arm = Resistance force  $\times$  its arm

$$50 \times 20 = \text{Resistance force} \times 5$$

$$\therefore \text{Resistance force} = \frac{50 \times 20}{5} = 200 \text{ Newton}$$

## Additional questions

(A) 1. root hairs      2. stomata - lower

(B) To make their own food.

24

## Sohag Governorate

1. (A) 1. effort force - resistance force.  
2. first  
3. effort force  $\times$  its arm = resistance force  $\times$  its arm.  
4. argon

(B) Effort force  $\times$  its arm = Resistance force  $\times$  its arm

$$500 \times 20 = 200 \times \text{its arm}$$

$$\therefore \text{Resistance arm} = \frac{500 \times 20}{200} = 50 \text{ cm.}$$

2. (A) 1. (✓)      2. (x) ... in parallel.  
3. (✓)      4. (✓)

(B) When one of the lamps damaged or turned off, all the other lamps in the house will turn off.

(C) 1. Do not play with the electric connections.  
2. Do not insert a metallic object in the socket.

3. (A) 1. Fulcrum.      2. Electric lamp.  
3. Third class levers.  
4. Electric conductors.  
5. Partial lunar eclipse.  
6. Parallel connection.

(B) 1. Because the effort arm is longer than the resistance arm, so the effort force is smaller than the resistance force.

2. Because the Sun emits harmful rays to the eye such as ultraviolet rays (UV) and infrared rays that may cause blindness within few seconds.  
3. To prevent turning off all lamps when one or more lamps burn out.

4. (A) 1. a. first  
2. c. copper.  
3. a. Fishing hook

(B) Solar eclipse : Its duration doesn't exceed seven minutes and few seconds.  
Lunar eclipse : Its duration may last for more than two hours.

- (C) ① Glass bulb.  
② Base of the light bulb.  
③ Tungsten filament.  
④ Argon gas.

## Additional questions

(A) 1. Root system.      2. Stoma.

(B) To make their own food.

25

## South Sinai Governorate

1. (A) 1. effort force - resistance force  
2. wood plastic.      3. battery.  
4. Moon - Earth      5. electric burns  
6. third class

(B) 1. Because water is a good conductor of electricity, so it increases fires and could harm the rescuers.

2. Because they are important in other things as :  
• Increasing distance.  
• Increasing speed.  
• Avoid dangers.  
• Accuracy in performance.

2. (A) 1. b. Wheelbarrow      2. c. remains as it is.  
3. c. iron.      4. a. Crowbar  
5. b. light      6. a. less than

(B) 1. Do not play with the electric connections.  
2. Do not place several connections in the same socket.

- (C) ① Sun.      ② Moon.  
③ Juhra.      ④ Earth.



3. (A) 1. (x) The fluorescent lamp ...  
 2. (x) ... is a second ...  
 3. (✓) 4. (✓)  
 5. (x) ... the force less than ...  
 6. (x) In the first class ...

(B)

Total lunar eclipse	Partial lunar eclipse
It is the lunar eclipse which occurs when the whole Moon enters the shadow area (umbra) of the Earth.	It is the lunar eclipse which occurs when a part of the Moon enters the shadow area (umbra) of the Earth.

(C) 1. e 2. c 3. d 4. a

4. (A) 1. Second class levers.  
 2. Filament.  
 3. Series connection.  
 4. Fulcrum. 5. Electric shock.  
 6. First class levers.

(B) Effort force  $\times$  its arm = Resistance force  $\times$  its arm  
 $48 \times 4 = \text{Resistance force} \times 6$   
 $\therefore \text{Resistance force} = \frac{48 \times 4}{6}$   
 $= 32 \text{ Newton.}$

- (C) 1. When one of the lamps damaged or turned off, all the other lamps in decorative lights will turn off.  
 2. The Moon light turns to be faint without being eclipsed which is known as lunar non-eclipse.  
 3. The filament will burn when it heats up.  
 4. When the temperature of the heater increases, it may burn the furniture and rugs causing fires.

## Additional questions

- (A) 1. (x) 2. (✓)  
 (B) 1. The plant cannot make photosynthesis process due to the absence of light.  
 2. The root hairs cannot control passing of some types of salts according to the plant's need.